

Chemical Week

November 27, 1954

Price 35 cents



► **Out of antifreeze, into new uses; methanol's ticketed to lick overcapacity sooner than later . p. 43**

Deer season sales tip: Hunt-gun enthusiasts open wide field for specialty makers p. 56

Jet engines spur lubricant competition; new diesters challenged by newer phosphorics . . . p. 74

► **Tires loom large in marketers' '55 planning as just-out auto models push tubeless trend p. 107**

More pounds of steak per prairie acre; that's future theme song for fertilizer sellers

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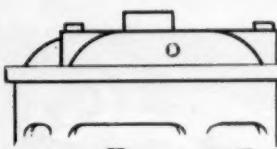
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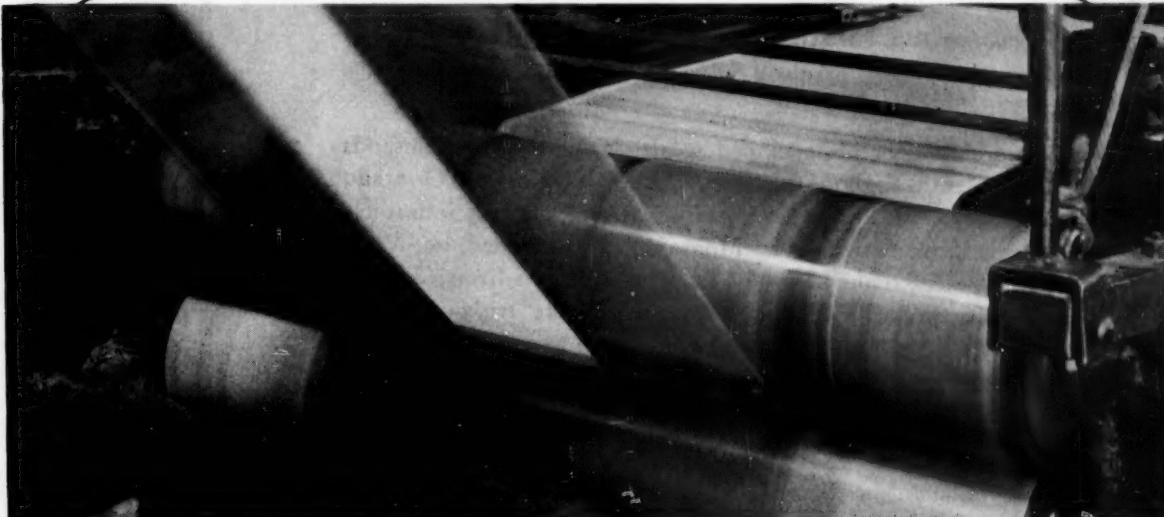
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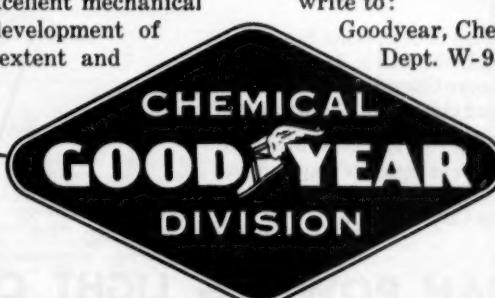
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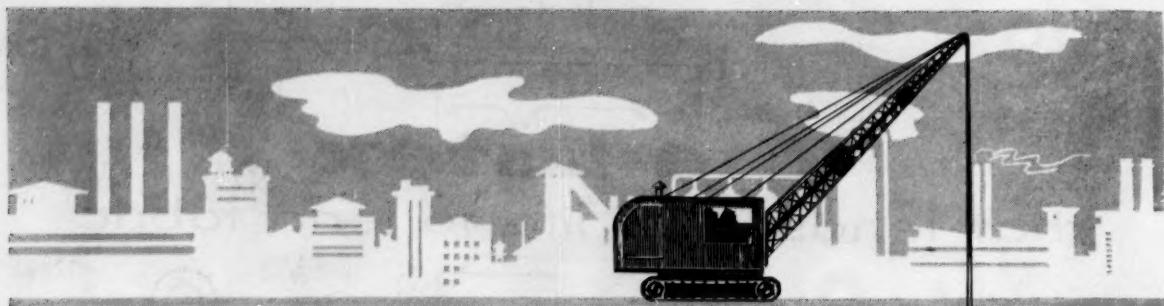
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Chemical Week

Volume 75

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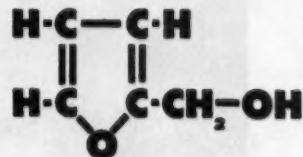
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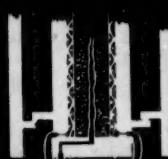
You get several times the washing efficiency with an Eimco over conventional plate and frame filters. The split cake which is evenly formed over the entire surface of each plate is washed by introducing the wash water through the feed port. Thus both surfaces of filter media are utilized for the outward passage of wash liquor, instead of only one surface as on conventional plate and frame filter. Washing efficiency is, therefore, at least doubled.

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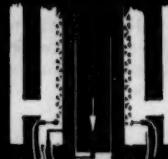
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Plates open to allow frame to enter and position for filtering.



Plates closed on frame — in this position the feed, wash and blow portion of the cycle are completed.



Plates open to allow filled frame to move down and out.



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OPINION...

One Ammonia View

TO THE EDITOR: In the "CW Report on Fertilizers," the authors, Messrs. Matthew and Perkins of Arthur D. Little, Inc., express some doubts as to the maintenance of a perfect balance in the nitrogen markets of the U.S. during 1955 but say that from 1956 on, the supply and demand "may well be closely in balance" and that the future of the U.S. nitrogen industry is "solid."

I agree with the authors regarding their 1955 forecast but feel sure that their long-term analysis is seriously in error.

The authors base their views on the facts that the amount of tillable land in the U.S. is virtually exhausted; consequently the only means available of feeding our increasing population is to raise crop yields on the land we have, which must largely be accomplished, so they claim, through heavier fertilization.

This, to my mind, overlooks the fundamental shift to pasturing operations now under way in agriculture. Unfortunately, the subject is so complex that it cannot adequately be discussed in an article and still less, in a letter. Nevertheless, I must make at least an attempt at describing the situation.

I must first point out that all the crops produced in the U.S. and all the plants pastured off the land during one year contain together about 7.5 million tons of nitrogen. During 1954 this quantity came from approximately the following sources:

Soil	1,000,000 tons
Manure	1,600,000
Legumes	3,300,000
Commercial fertilizer	1,600,000

Total 7,500,000

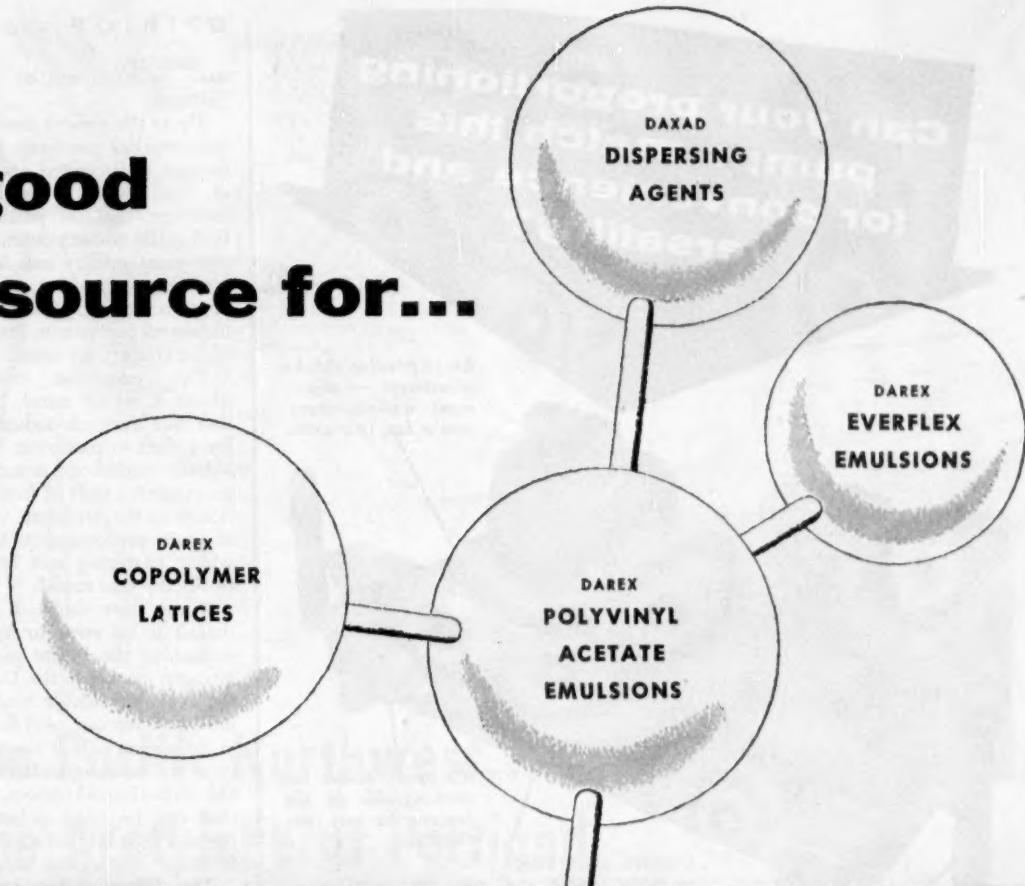
Actual consumption of commercial fertilizer nitrogen (1954) will be about 1.9 million tons; (in the preceding figures I have omitted, however, 0.3 million tons in order to allow for losses from leaching). The 1.9 million tons is distributed approximately as follows:

Corn	875,000 tons
Cotton	270,000
Small grains	290,000
Vegetables and fruits	250,000
Hay and pastures	120,000
Tobacco	32,000
Other crops	63,000

Total 1,900,000

These data suggest that only about 35% goes on crops that are consumed as such, principally on vegetables and cotton, whereas the remaining 65% is

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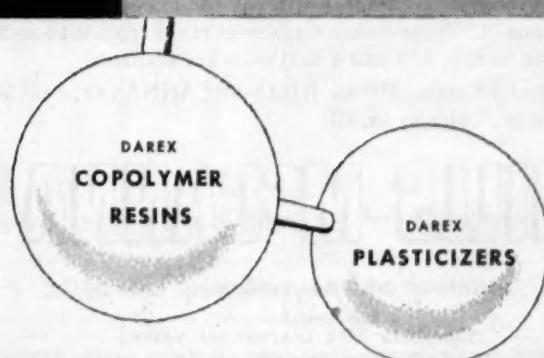
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OPINION

used on crops fed to animals or on pastures.

Up to the present time our livestock industry has generally rested on the feeding of harvested grains, especially of corn. Recently we have learned, however, that on pastures not only beef cattle or dairy cows, but also hogs and even poultry can be maintained at a cost only about one-quarter that of grain feeding, provided really good, improved pastures in the humid parts of the country are used.

This enormous cost difference places it, to my mind, beyond doubt that our livestock industry is headed for a shift to pasturing. This shift has already started and is accompanied by an extensive shift of livestock production from the Midwest, where feeding of grain predominates, to the South, where pasturing can be used practically the year round.

These facts show, in my opinion, that it is an error to operate, when appraising the future position of the nitrogen market in the U.S., only with the available tillable land: about 450 million acres out of 1.9 billion acres in the country. It is necessary to estimate the total agricultural land available in the humid regions, i.e., the land that can be used either for raising crops or as good pasture. This amounts to about 750 million acres.

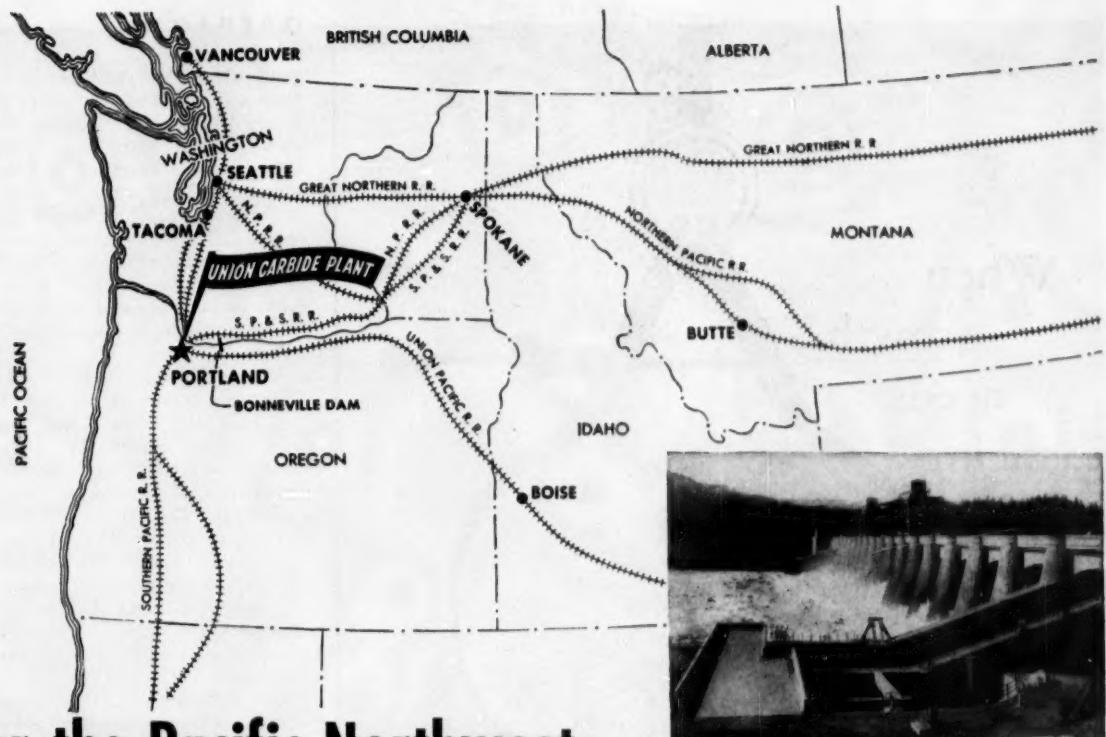
The difference between these two estimates is 300 million acres. This area now either lies idle in the humid parts of the country or is employed only for growing usually poor forests. All of this is readily available, however, for producing livestock by pasturing methods.

Since on an acre of good Southern pasture one "animal unit" (a mature cow) can be maintained practically the year round and since the total number of animal units in the U.S. is only about 100 million, any claim as to an impending shortage of agricultural land in the U.S. is far from the truth.

. . . We have . . . the 300 million acres of "new" pasture lands, plus present tillable land, and some 700 million acres of semiarid pastures in the West, where yields can be trebled without using commercial nitrogen.

. . . The most important fact is that good improved pasture, once it has been established, does not need applications of commercial nitrogen; such a pasture always contains not only grasses but also legumes, which fix nitrogen from the air. On some pastures every year 300 lbs. of nitrogen are fixed per acre by legumes, which amply suffices in maintaining the pasture in a highly productive condition.

It may be true that through throwing commercial nitrogen, even on a



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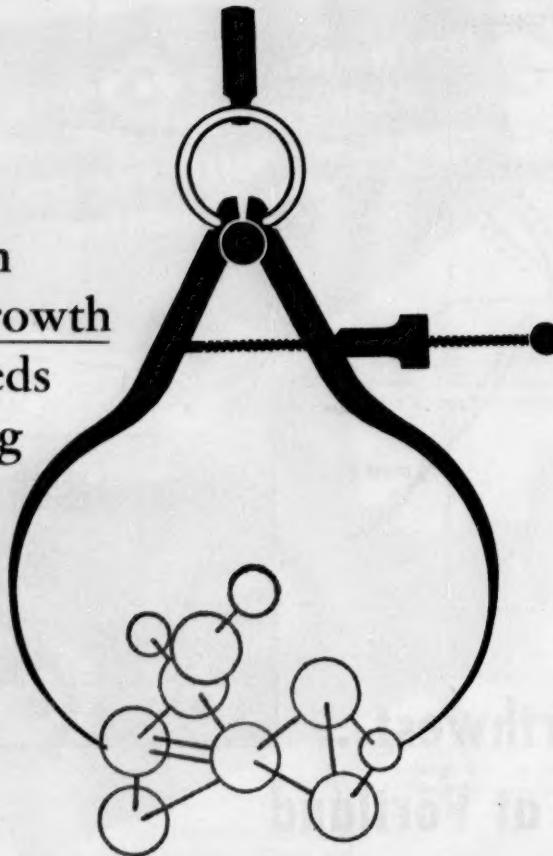
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OPINION

good pasture, the yields can be further increased. I assert, however, that it would be an error to do so. For the above figures have shown that the U.S. possesses overabundant land resources, and the sensible thing to do doubtless is, therefore, to put as much as possible of it to use as pastures since under the sod the land always improves in quality, whereas land for raising crops or land allowed to lie idle deteriorates through erosion and other factors.

Under these conditions I have no doubt that sooner or later the shift to the pasturing system will virtually wipe out the market for commercial nitrogen in the U.S. so far as this commodity is applied to crops that are fed to animals. This, at present, accounts for approximately 65% of the total agricultural market for commercial nitrogen, or for some 1.2 million tons.

I have no doubt that commercial nitrogen's prospects are exceedingly poor, at least so far as agriculture is concerned. . . .

. . . Unfortunately, the nitrogen industry has taken a wholly fictitious demand as the basis for embarking upon an enormous expansion program.

This program is just at the point of again being stimulated through the entrance of oil refineries into the ammonia field.

The development is, according to my inquiries, due to the fact that modern catalytic equipment used by the refineries yields as a by-product a fairly pure hydrogen.

My inquiries, which are not yet completed, suggest that with the help of such by-product hydrogen 1 ton of ammonia can be produced for about \$23, whereas the cost of the plants using natural gas is approximately \$45. Under these circumstances it must, to my mind, be expected that many refineries will establish an ammonia plant—in part, on the assumption that fertilizer nitrogen has a "solid" future. In my opinion, these new ammonia plants and the various other developments described by me will simply mean that from about 1958 on, the present ammonia factories using natural gas or coke, which represent an aggregate investment of about \$1 billion, will have to go out of business.

The problem I am discussing is enormously important and should receive the immediate attention of the chemical industry.

H. C. KUTHE
9246-52nd Ave.
Elmhurst, N.Y.

*Reader Kuthe will be pleased to note that we have not completely neglected rangeland fertilization. See page 113.
—ED.*



Out of the desolate, flat land . . .

at Tuscola, Illinois, there has grown the giant plant of the National-Petro Chemicals Corporation, manufacturer of ethylene and many of its by-products.

Necessary to this installation is sufficient storage capacity to handle the materials used in its many processes. The tanks pictured above are part of more than 2,000,000-gallon storage capacity built by Graver. They contain sulfuric acid—an

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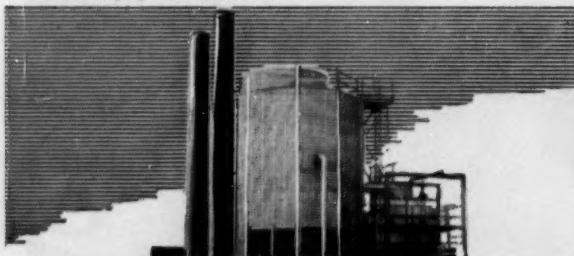
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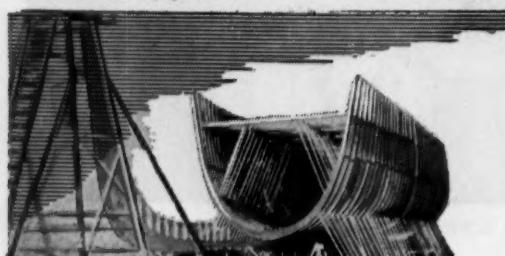
Railroads find that Diesel locomotives with chromium plated cylinder liners extend the periods between overhauling jobs. Another application for Mutual Chromic Acid.



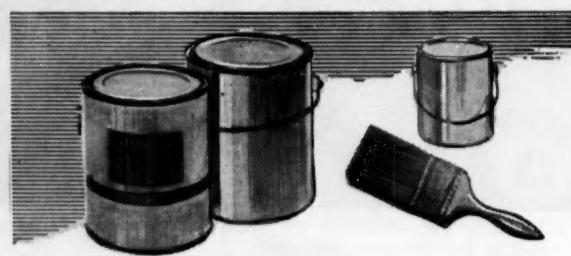
With water becoming scarcer, many industrial users recirculate water in cooling systems. Mutual Chromates effectively control corrosion of equipment.



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NEWSLETTER

"Chemicals in foods" will be back in the limelight when the new Congress convenes in January. At least four new food and drug regulation bills are likely to be introduced after the turn of the year:

- Former Delaney Committee counsel Vincent Kleinfeld is readying two bills for introduction by Rep. Delaney (D., N.Y.).
- The miller-baker-meat industry group is redrafting its own food-additive restrictions for reintroduction by Congressman Joseph O'Hara (R., Minn.).
- Another food industry group—with tacit encouragement from the Manufacturing Chemists' Assn.—is behind the fourth measure, the only one that does not require formal Food & Drug Administration sanction for additives.

Outlook: virtually no chance of new cosmetic regulation next year; a somewhat better chance of food additive measures. In either case, no decision is expected before the 84th Congress' second session.

Concerned that the Topsy-like growth of its sprawling research program may be nearing the point of diminishing returns, Southern California Air Pollution Foundation is proposing a new \$2.2-million outlay to wrap all its smog studies into one big package.

The consolidated program, now before the Los Angeles County board of supervisors, would be financed jointly by the county (\$986,550), foundation (\$702,350), state (\$435,500), and federal government (\$90,000).

Still another firm—Kaiser Engineers, division of Henry J. Kaiser Co.—has joined the already-sizable collection of industrial groups plumbing the potential of nuclear power generation. Kaiser has just entered into an agreement with the Atomic Energy Commission calling for an evaluation of the technical and economic aspects of industrial nuclear power.

Coming under AEC's industrial participation program, the study is expected to yield:

- A survey of reactor progress, to date.
- An estimate of the feasibility of building an industrial power reactor in the near future.
- The magnitude of the research and development still needed in the industrial power field.
- General recommendations on the broad subject of nuclear power development.

There's a new face in the cortisone picture. This week, E. R. Squibb & Sons (division of Olin Mathieson Chemical Corp.) unveiled a corticosteroid said to be 10 times as active (topically) as cortisone.

The extrapotent hormone is fluorohydrocortisone acetate, first commercial dividend of Squibb's pioneering research on halogenated cortisones. Squibb uncovered the drugs last year (*CW, June 13, '53, p. 50*) during a search for a feasible method of converting easily obtainable (but biologically inactive) 11-epihydrocortisone into therapeutic hydrocortisone.

Exclusively a product of synthesis, the fluorinated derivative does not exist in the body's hormone system.

NEWSLETTER

Justice Dept. last week wrapped up its antitrust cases against companies in the chlorinating equipment industry. District Court Judge William Day, in Providence, R. I., imposed fines of \$10,000 against two officers of Wallace & Tiernan and accepted a consent decree against Builders Iron Foundry.

Like the consent decree entered against Wallace & Tiernan and corporate fines of \$53,000 imposed last July, the court action is designed to break up an alleged monopoly in the manufacture and sale of chlorine-feeding equipment.

In another court action, the Illinois Supreme Court paved the way for Chicago's participation in the St. Lawrence Seaway project. Upholding a lower court, it held valid the creation of a regional port authority, opening up the Chicago area's port development plans.

Negotiations between the city and the authority are still incomplete, but a \$25-million development program is in the offing.

"Quantum jump, retired Army Col. Harry Hardsog's fantastic scheme for boosting 8000-fold the usable energy from coal (*CW, June 26, p. 19*), has found a buyer. Fairchild Engine & Airplane Corp. has negotiated with Hardsog, will establish him in a laboratory at Northboro, Mass., to develop his theory. Says one government agency, which evaluated the process, "The invention, though not completely tested, has a reasonable chance of successful operation."

"The chemical industry deserves a good share of the credit for helping to make America's 1955-model passenger cars the most attractive and colorful in automotive history." Thus did Chrysler Corp.'s vice-president A. vanderZee keynote his talk before the Chemical Market Research Assn. in Detroit's swank Sheraton-Cadillac hotel last week.

vanderZee cited the improvements made in automotive finishes in recent years, and the development of new man-made fibers for automobile upholstery as two of the chemical industry's most important contributions to improve durability and eye appeal in passenger cars.

General Electric's John W. Weil and Standard Oil of California's R. G. Follis are agreed on one thing: atomic power won't spell the end of the oil industry. But they differ on ultimate effects.

Says Follis: "Even when allowing for more rapid development of atomic power than is contemplated by the best informed . . . , the principal problem of the oil industry will be to expand . . . to keep up with growing demand . . . Nuclear energy can have only a minor effect . . . Power generation now represents only 3% of the total oil demand . . ."

Says Weil: "in the not-too-distant future, . . . we will see gas, oil and coal start to assume what will probably be their ultimate role—raw materials of a greatly expanded chemical industry . . . The world will continue to use its chemical fuels in ever-increasing quantities, until atomic power assumes its expected role as a major power source."

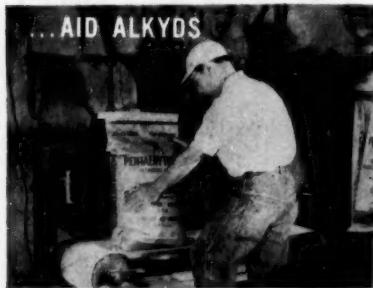
Meanwhile, Standard Oil Development Co. is making sure that it's covering both bases: it will build a new radiation laboratory at Linden, N. J., the goal of which will be "to apply the vast potential of atomic energy to the petroleum industry."

. . . The Editors

HOW HERCULES HELPS...



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BUSINESS & INDUSTRY

Here's How Expansion Projects Shape Up Today

(in thousands of dollars)

	Completed Within Past 12 Months	Now Under Construction	Firmly Planned for Construction	TOTAL
Agricultural chemicals	\$302,611	\$153,150	\$139,675	\$595,436
Metals and Alloys	50,220	29,150	74,550	153,920
Petroleum, Natural Gas	58,850	58,000	—	116,850
Polymeric materials	254,571	298,509	63,170	616,250
Sulfur, Sulfuric Acid	37,076	25,300	4,000	66,376
Synthetic organics	190,771	150,086	125,560	467,417
Miscellaneous	303,199	197,237	156,930	657,366
TOTAL	\$1,197,298	\$911,432	\$564,885	\$2,673,615

How Much and Where

Timed to coincide with its semiannual meeting in New York this week, the Manufacturing Chemists' Assn. proposes a new index to chemical industry expansion—one that's sure to cause more than a ripple of interest in government circles.

According to MCA's tote-up, some \$1.5 billion in chemical plants are now under construction or "firmly planned" for future construction. Add to this the \$1.2 billion worth of plants already completed in the 12-month period ending Oct. 31, and you have a puzzling figure, compared with that prodded by government statisticians.

The reason can be explained, however. Whereas other surveys of capital spending (including that recently compiled by the McGraw-Hill Dept. of Economics, CW, Nov. 13, p. 24) normally include chemical expenditures by nonchemical companies under the firm's main line of business, MCA's system of classification is somewhat different. It (1) includes all chemical facilities regardless of the main business of the builder (therefore taking into account the large chemical investments being made by rubber, oil, steel, pulp and papermakers), and (2) clas-

sifies projects by those completed, now under construction, or definitely planned—instead of calculating money spent on construction on a strictly fiscal-year basis.

Too, where other estimates of capital spending include tentatively planned expansion, MCA's figures include only firmed-up projects—usually those that have been formally approved by a company's board of directors.

Really No Discrepancy: It means of course, that there's really no discrepancy between the surveys—simply a difference of approach.

On a state-by-state basis, the MCA survey will probably be of greatest value. Planned as an annual affair, it's sure to show indications of the changing geographical profile of the chemical process industry in the years ahead even more clearly than it does now.

For example, this year's survey indicates that:

- Largest expenditures for contemplated expansion in the chemical process industry are centered among companies with large holdings in the South and Southwest—with the state of Texas far in advance in total dollar

expenditures. A total of \$574 million in 72 construction projects are on tap in Texas—a figure calculated to boost its ranking as a chemical manufacturing state by 1956. It's now the fourth-largest.

- Ranking second in construction projects is the state of Florida—not traditionally recognized as a state of great chemical activity. Estimated value of 17 projects there stands at a hefty \$236 million. Running a close third: Louisiana—with 26 projects totaling \$233 million.

- New Jersey, New York and Illinois—ranking one, two, three in overall chemical industry—didn't even come close to matching the newcomers in planned projects. They'll add, MCA says, \$68, \$67, and \$169 million in new plants, respectively.

- The three West Coast states, however, continue to grow as chemical centers—with 51 construction projects valued at some \$200.5 million. California leads with 37 projects totaling \$173.6 million.

Such figures, apart from their interest value, can offer vital (and often otherwise unavailable) information to chemical producers.



REPS. RAYBURN, COOPER: For freer trade laws, new drive planned by Demos.



WIDE WORLD

Right Where They Left Off

All the tariff problems that were postponed this year for further study, plus a number of new posers on this subject, will be tackled early next year by the new Congress—whose Democratic majority is eager to pick up the freer trade battle right where its members left off in 1952.

Rep. Sam Rayburn (D., Tex.)—who'll resume his old duties as speaker of the House of Representatives—and Rep. Jere Cooper (D., Tenn.)—who'll be the new chairman of the powerful Ways & Means Committee—have made it clear that their party will be willing to go as far as President Eisenhower—or maybe a little bit farther—in setting up more liberal laws for foreign trade. It's expected that trade and tariffs will be the first order of business for Cooper's committee, with hearings probably to start in January.

With Congress planning to act on a reciprocal trade bill (best bet: a three-year extension), with the renegotiation pot boiling briskly in the 84-nation conference of the General Agreement on Tariffs & Trade (GATT) at Geneva, and with hearings coming up on tariff concessions for Japan, all the organizations interested in international commerce are either firing new argument missiles at Congress or are recasting old persuasion ammunition into new casings to fit the temper of the times.

First Salvo Fired: Of concern to chemical companies is the fact that the first salvo in this new exchange is one that resounds against some of the main

points propounded by the Synthetic Organic Chemical Manufacturers Assn., the industry's chief watchdog on tariffs.

Out this week, the new statement on national tariff policy by the Committee for Economic Development's Research & Policy Committee is a frank plea for freer trade. While both CED and SOCMA use the term "selective" tariff reduction, SOCMA holds that selecting should be on the basis of providing tariff protection for capacity for defense-needed materials. CED thinks that the selecting should be done in such a way as to make more and firmer friendships for the U.S. among the nations we trade with.

CED's report—providing material that may be used by freer-trade congressmen in the coming debate—also recommends:

- Five-year extension of the Reciprocal Trade Agreements Act, with the President empowered to cut tariff rates by 5% each year.
- That "export value"—not U. S. selling price—be made "the preferred, initial standard of valuation."
- Making "substantial reduction in output and employment," rather than merely "any reduction of domestic output," the criterion for peril-point and escape-clause actions.

On the other hand, at least one CED recommendation is in accord with SOCMA credo: "Administration of the (Antidumping) Act should be speeded up to give American industry

more effective protection against dumping."

Numerous chemical items are among the Japanese products to be considered for possible tariff reductions in upcoming trade negotiations. Testimony on this proposal—statements relating to individual chemical products—will be received by the Tariff Commission in hearings Dec. 13.

No Truce in Ad Cases

Entering their liveliest stages this week are the Federal Trade Commission's actions against two manufacturers of chemical products, Evis Mfg. Co. and Pioneers, Inc. In both cases, FTC is holding hearings on its complaints charging the companies with false advertising.

After FTC lawyers completed their side of the Evis case, in which they tried to show that advertising of that company's metal "water conditioners" has been misleading and deceptive, Evis asked the hearing examiner to dismiss the complaint for lack of proof. Last week, however, Examiner Abner Lipscomb ruled that a *prima facie* case had been made against Evis, and refused to dismiss the action.

Evis contends that FTC's case amounts to only this: (1) that any product for which FTC's experts can find no scientific explanation "must be a fraud on the public"; and (2) that Evis' advertising and instructions are to be "judged in a vacuum without regard to the realities of the American market place."

Scientists Quizzed: In the long-standing feud over Pioneers' battery additive AD-X2, sparks are expected to fly this week when Allen Astin, director of the U. S. Bureau of Standards, takes the witness stand to be cross-examined by Pioneers President Jess Ritchie and his lawyers.

Astin, who was temporarily suspended from office last year in connection with this case, testified last week as hearings were resumed that he and Ritchie had agreed on general procedure of testing AD-X2 several years ago. All personnel who did the testing and analysis of results, Astin said, had to refer to the individual batteries only by number and did not know which ones contained AD-X2. If the additive had a clear-cut effect, he continued, the treated batteries' records would have been notably different from the others' records. And B. F. Scribner of the Bureau's spectrochemistry section said he had found nothing in an acid solution of AD-X2 that wasn't also present in a solution of sulfuric acid, epsom salt, Glauber's salt, and ordinary tapwater.



WILLARD STEWART, INC.

MCA'S DICKERSON: In Boston, closed-door session opens pollution series.

Candor in Confidence

"Strictly among us plant managers"—that's the kind of a gathering that the Manufacturing Chemists' Assn. finds is most conducive to getting plant managers to talk about their pollution problems with the kind of candor that leads to helpful interchange of ideas. This—according to a spokesman for MCA's water pollution abatement committee—was the finding after last week's test run of a regional meeting on the subject. Following the well-received New England water pollution abatement workshop in Boston (CW Newsletter, Nov. 20), MCA let it be known that it's planning to continue the series with a Middle Atlantic regional meeting, possibly in New York or Philadelphia, probably in February.

About 25 plant managers or their representatives attended last week's cozy, closed-door session on the mezzanine floor of Boston's Hotel Statler. Exclusion of the public and the press encouraged delegates from 14 leading chemical companies' New England plants to let down their hair, speak freely about their water pollution headaches.

Plug for Officials: Heading the panel that handled the more formal discussions was Hercules Powder Co.'s Bruce Dickerson, chairman of the MCA committee, who gave a digest of state pollution laws in Massachusetts, Rhode Island and Connecticut. Other panelists: Allied Chemical's Raymond Hess, Du Pont's Harold Jacobs, and General Electric's Kenneth Watson—who formerly served as a state pollution control official in West Virginia.

Plant managers in the southern New England states, agreed Jacobs and Watson, should not shrink from taking up their pollution problems with the cognizant regulatory agencies in those three states. Officials of those bureaus, the panelists said, are reasonable men committed to carrying out reasonable programs.

Next, panel members dove into detailed talk about various types of industrial pollution—soluble organics, acids and alkalies, oils and tars, soluble inorganics, insoluble and undissolved substances, toxic metals and their salts, sanitary sewage—and the effects of each.

Treatment Methods: Second half of the all-day meeting focused on means of combating water pollution. Biological, neutralization, and flotation, separation and burning methods were summarized by Hess; Jacobs reviewed lagooning and controlled discharge; and Watson told about chemical treatment and municipal systems.

Finally, the meeting was thrown open for a general discussion of seven major plant problems:

- Disposal of sanitary sewage when no existing facilities are available.
- Municipal disposal vs plant treatment.
- Requirements for disposal of industrial wastes into municipal systems, with special reference to BOD and chlorine demand.
- Effect on municipal treatment systems, including sludge digestion of various chemical constituents in waste effluents.
- Treatment of dilute and concentrated wastes for discharge into streams containing oils, dyes, soluble salts, solvents, acids, alkalies and metal salts.
- Treatment of oily waste discharges to eliminate oil slicks in streams.
- Reduction of finely divided solids in plant effluents to provide satisfactory quality for discharge into streams.

One conclusion reached by the plant managers: where several chemical plants are located along a single stream, their managements should cooperate in pollution control to keep the abatement burden as light as possible for each plant.

Meanwhile, MCA is continuing its antipollution work along other lines as well. Earlier this fall, it granted funds to finance an investigation of Pennsylvania's Schuylkill River by the Limnology Dept. of the Academy of Natural Sciences, Philadelphia—a study to measure effects of pollution control along the stream in recent years.



WIDE WORLD

PETTIBONE: Despite few divergencies, lawyers are readying contracts.

Optimistic, No More

The chief salesman for the team that's hoping to sell the government's \$500-million synthetic rubber monopoly is now reasonably optimistic that his commission can deliver a disposal package to Congress next year.

Rubber disposal commission Chairman Holman Pettibone, who made the commission's first official statement to bidders last week, didn't have the last word, however.

Said a fellow commissioner after the meeting: "If this meeting had been two weeks later, we might have had a lot more to report."

As it was, Pettibone was far from pessimistic over whether the commission can negotiate successfully with bidders by the Dec. 27 deadline. Highlights of his report:

- Some companies are close enough to meeting the commission's target price that lawyers are going ahead in drawing up contracts for future signature.
- In setting its target prices, the commission has looked primarily at the potential earning power of each plant, rather than such other criteria as replacement value, government's net cost, or depreciated book value.
- However, there are still "wide divergencies" between commission and bidders' thinking on some plants. Unless companies can justify that their bids are full, fair value, they won't get plants.
- Nevertheless, the commission "remains optimistic" that a program can be put together after the deadline—only four weeks away—which can then be recommended to Congress.

BUSINESS & INDUSTRY

Under the disposal law passed by Congress in 1953, the commission then has 30 days to submit its disposal package to Congress, along with an opinion from the Justice Dept. on anti-trust questions. Either Senate or House may then vote to disapprove the whole package or individual sales, but if single plants are turned down, any other bidder may withdraw. Since some liberal Democrats have considered the program a "giveaway," there is some question as to whether the program can get through. However, since these people are in the minority, there's little doubt the program would be approved—if the commission comes up with a price it can justify.

COMPANIES

Merger of the two trade associations that represent the \$2-billion/year fertilizer industry has been sanctioned by one—the National Fertilizer Assn. The other party in the deal—the American Plant Food Council—will vote on the merger in Washington on Dec. 1, but observers are predicting the move will be passed by a wide margin. Urging the plan, Russell Coleman, association president, notes that "even though farm prices last year fell 21% below 1951, plant food sales continued to increase. Such a decline of farm income would have been disastrous to fertilizer sales 10-15 years ago. But through education, farmers are gradually learning that fertilizer must be used for profitable farming regardless of whether farm prices are high or low." That's the function of trade organizations, he continues; and they can only do a nationwide job with a nationwide organization.

Dameron Enterprises, Inc., Louisville, Ky., has obtained a charter of incorporation to manufacture and sell cleaners and soap. Authorized capital stock: 250 shares, \$100 par value.

General Services Administration has accepted a \$227,000 bid from Lerner Investment Co. (San Francisco) for an industrial alcohol plant at Springfield, Ore. Built by the Defense Plant Corp. during the war for more than \$3 million, the plant will now be junked by Lerner.

Superior Fertilizer and Chemical Co. (Tampa) has purchased all the assets of Growers Fertilizer Co. (Fort Pierce, Fla.). Terms of the deal have not been revealed.

Dow Chemical Co. (Midland, Mich.) has purchased all the assets of Ver-

senes, Inc. (Framingham, Mass.)—producer of chemical specialties. Dow will pay cash for all outstanding stock, effective Dec. 1; but total sales price hasn't been released.

East Texas Pulp & Paper Co. will start operations Dec. 1 at its \$27.5-million paper mill at Evadale, Tex., with a daily capacity of 300 tons/year of bleached pulp and kraft paper.

EXPANSION

Polyisocyanates: Du Pont Co. will build additional polyisocyanate facilities at its Deepwater Point, N.J., plant. Work is expected to start immediately; completion is scheduled for mid-1956. All design and construction work will be handled by Du Pont's Engineering Dept.; no capacity figures have been released.

Newsprint: The board of directors of the Southern Newspaper Publishers' Assn. has endorsed a proposal to build

a fourth newsprint mill in the South. (Three newsprint mills located at Lufkin, Tex., Coosa Pines, Ala., and Calhoun, Tenn., now turn out an estimated 390,000 tons/year of newsprint.) According to present plans, Fred Dierks, Mt. Pine, Ark., will build the plant at a cost of over \$12 million. Capacity: 50-60,000 tons/year.

Superphosphates: Hughes-Johnson Chemical Co. is building a 20,000 ton/year superphosphate plant in Portland, Ore. Production should start sometime around the first of January.

Sulfuric Acid/Canada: Inland Chemicals Canada, Ltd. will build a \$1-million sulfuric acid plant at Fort Saskatchewan, Alberta. Construction is scheduled to start within the month; the plant will be built on property adjacent to the nickel ore processing plant of Sherritt-Gordon Mines, Ltd., and will use (as feed stock) pure sulfur produced by the Shell Co., Canada, at its Jumping Pond, Alberta, natural gas treating plant.



WIRE WORLD

No Mail, No Apples

TRUCK DELIVERY gave way to aerial service at Allied Chemical's Nitrogen Division's plant at La Platte, Neb., when pickets of the AFL's Metal Trades Council prevented mail and fresh fruit from

going in to supervisors who kept the plant operating during the recent two-week strike. Settlement terms: 4½¢ wage increase now, another 4½¢ next November, a no-strike clause, new seniority rules.



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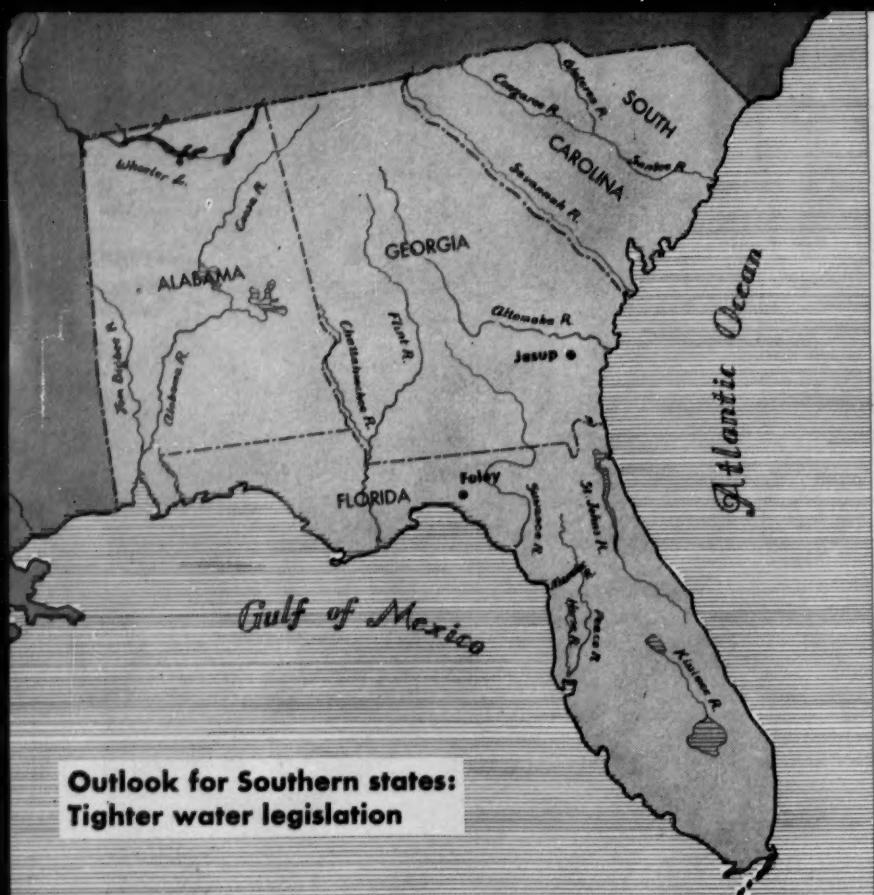
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**Outlook for Southern states:
Tighter water legislation**

SOUTHEAST STATES: Up in arms over last summer's serious drought conditions.

Pressuring for Control

There's every indication this week that the southeastern U.S. may be in for a round of tighter water control legislation. Reason: empty river beds and muddy reservoirs last summer threw a scare into civic groups and water control agencies; and all the hubbub over pollution has alerted the public to the pressing need for water legislation.

Actually, water control legislation, if it comes, will be a radical switch in tack for the Southeastern states—long noted for their *laissez faire* policies. Abundance of water has been used as a chief selling point to lure chemical industry southward; a number of chambers of commerce have puffed "cheap water" as one of the South's greatest natural resources.

But that's all virtually forgotten now as irate citizens clamor for relief from drought conditions. Making the situation worse (as far as chemical companies are concerned): much of the rancor over effluent dumping has been a direct outgrowth of the water shortage. As public supplies have

dwindled, antagonism against industrial water users has grown. Result: it's almost certain now that by next spring most state legislatures will put teeth in laws to govern effluent dumping.

Trigger for Action: Example of the sort of feeling that's prevalent in the Southeast today was evidenced recently at Rayonier's new plant on the Altamaha River near Jesup, Ga. Rayonier was accused of industrial dumping after unexplained fish-killing left the exposed banks of the river covered with putrefying fish of all sizes and shapes. (CW, Oct. 2, p. 23).

And just weeks before, chemical and mining plants along the Horse, Peace, and Manatee Rivers in Florida were suspected of contributing to the development of the fish-killing blooms along Florida's West Coast.

"Public reaction to the fact that most Southeastern states simply have no regulations to control use of water or dumping is the biggest single factor behind the current push for legislation," admits one chemical execu-

B & I

tive. "Most citizens simply didn't know or care about the situation until it caught up with them. Then their wrath turned against chemical companies in the area—as the natural target for their own negligence."

In Georgia, for example, there has never been any specific ruling as to "how much . . . or what" industrial concerns could dump into the streams. For the most part, companies policed their own effluent; but actually the state had no legal protection against pollution.

Now, however, a bill is being drafted (with the help of a number of civic groups) to govern both industrial water intake and waste disposal. And despite opposition in some quarters (Governor-elect Marvin Griffin is reported not in favor of water control), public support is so great that most observers feel that some sort of legislation will be on the books soon after the state legislature convenes in January.

Others React Similarly: In South Carolina, the situation is somewhat different but the result's the same. Unlike Georgia, South Carolina has already taken steps to protect its water supply, is expected to pass a water control bill next legislative session.

In Alabama, although no new legislation to tighten water control is yet being considered, it's a good bet that by the time the legislature convenes in January, a bill calling for statewide control will be introduced. Already, state health officers are demanding a tighter rein on dumping of sewage into streams, and during the recent election campaign, a number of candidates proposed that industrial plants be forced to filter effluent. Such a law could mean millions of dollars in additional construction costs to Alabama's rapidly growing chemical industry.

Action in Florida: Long conscious of its water resources, Florida (particularly conscious that pollution may affect its billion-dollar/year tourist business) has had water control laws on the books since 1927. But, as in the rest of the Southeast, Florida's law today has few teeth in it. Any company depositing deleterious substances in lakes, rivers and streams may simply be found guilty of a misdemeanor, fined up to \$500 for each violation. "But that law, according to complaints now, is virtually ineffective because of a proviso that the penalty will not be levied until the State Board of Health has set a time limit for the company to cease dumping and mend its ways." Nothing in



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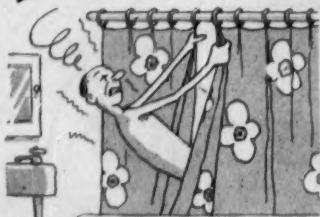
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BUSINESS & INDUSTRY

the law spells out in advance the ground rules for industry, what the effluent may contain before it's poured into the state's streams.

There's no doubt that such a lack of specifications is a major headache to chemical companies in the area—one they'd like to remedy as quickly as possible.

But the current tenor of public feeling is such that most chemical men in the Southeast today feel that the laws will likely go too far. And that would promulgate a rash of new problems—both legal and of a public relations nature—for companies with plants in that area.

counsel for importer W. C. Von Clemm, wants Union Carbide's Linde Air Products Co. division to be ordered to answer 17 queries such as:

- Are you actually making star rubies and star sapphires without using annealing and a 90° oriented seed?

- State every respect in which your commercial process differs from that disclosed in Linde patent No. 2,488,507.

Linde attorney Frederick Shea is asking the court to disallow these interrogatories. He says that Linde has agreed to produce two responsible employees for examination by the plaintiff's lawyer on Dec. 1, and argues that no party should be permitted to use both interrogatories and examinations at the same time.

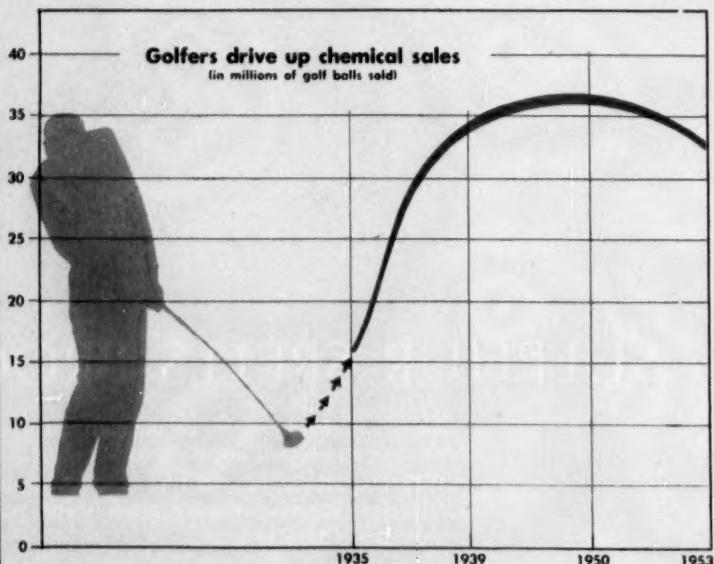
Cooke denies that court rules prevent use of both discovery procedures at once, and insists that the interrogatory is needed to show whether the Linde patent fully covers the star gem process.

Copious Curiosity

Just how many and what kind of questions a plaintiff is entitled to hurl at a defendant is the issue being argued this week in the synthetic "star gems" lawsuit in U.S. District Court, New York.

Attorney Thomas Turner Cooke,

IMPACT



No Par on Chemicals

ALMOST WITHOUT FANFARE, the little golf ball has moved out of the amateur ranks and into the class of big business in the chemical industry. Under a surface coating of alkyd resins or tung oil paint, most manufacturers today use a balata-rubber (50-50) cover (0.25% by

weight). The center's built of either rubber or silicone—wound with rubber thread (0.75% by weight). Accelerators and anti-oxidants (0.3% of the rubber content) are used in "curing"; chlorine, alcohols, and ketones are employed before painting to clean the surface.



Paint manufacturers have been quick to recognize Reichhold Chemicals' "Wallkyd" as a versatile, inexpensive and easily handled alkyd resin vehicle—for everything from flat wall paints to gloss enamels. One important reason for its widespread acceptance is the outstanding durability and color retention which this Glycerine-derived resin imparts to paints.

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Glycerine provides Durability

Alkyd resins practically revolutionized the paint industry when they were first introduced back in the 1920's. Each year, resin manufacturers continue to develop new, improved alkyds—such as Reichhold's "Wallkyd." And each year Glycerine continues to prove its unmatched versatility as a raw material for resin manufacture.

Paint makers are well aware of the improved durability, color retention, flexibility and other desirable properties Glycerine-based resins bring to their paints. Resin producers, too, know the advantages of Glycerine . . . how much simpler it is to work with in the resin-making operation. They like its better cooking qualities and the easier control it permits.

TECHNICAL DATA

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12-page booklet on
Glycerine standards
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16-page booklet on
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and applications

For your free copy of either or both of these booklets, write Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.

*Nothing takes the place of
Glycerine*

Something to Be Thankful About

Caught in a postelection, pre-Thanksgiving mood of reflection last week, chemical men from coast to coast were openly optimistic about their prospects in the months ahead. Earnings, they agree, should continue to climb gradually; the newly elected Congress (barring its expected crackdown on mergers) shouldn't affect chemical legislation too adversely; inventories should hold firmly at low levels; prices (if anything) should rise slightly.

*What will result
from Justice Dept.'s
probe of mergers?*

Only sales costs ("brought about by the recent rapid expansion and furious competition in certain sectors of the chemical industry") continue to plague a number of chemical producers. October sales expenditures, in one Midwestern company for example, were up 30% over September; management sees no immediate relief for the tremendous dollar flow into sales.

"We aren't fretting about increased manufacturing costs," states an East Coast basic chemical producer. "They may even decrease in 1955. But sales costs are booming; nobody sees an end to it, either."

Long-Range Repercussions: Earnings, over the long haul, will probably be affected by the new Democratic Congress, chemical men believe, but apart from the corporate tax changes, already affixed by law, there probably won't be any immediate effect on

*Is overseas
expansion advisable?*

chemical companies. Most companies frankly admit they're continuing to base their estimates for '55 on a continuation of the present corporate tax rate structure, think "there's only a very slight chance that the Democratic Congress won't kill the reduction scheduled for next May." Consensus: "with Harry Byrd heading the Senate's tax committee, you can be sure there will

be no reductions without a balanced budget first."

Labor—except in scattered areas—isn't a big headache to chemical executives today. Apart from the psychological impact ("it's been quiet too long") most management men feel they have the labor situation well in hand. Says one Western vice-president: "For the first time this year we've negotiated a two-year contract with the union—with no wage reopeners. We gave a 5¢ hike, along with about 1½¢ in fringe benefits. But what's more important, we're finding that unions are becoming increasingly conscious of our problems. Now they're thinking realistically . . ."

"The only thing we see here that might throw a monkey wrench into the present peaceful labor situation in the chemical industry," suggests one Western manufacturer, "is the possibility that the auto industry might grant a guaranteed annual wage. If that happens, we're sure to have trouble."

Overproduction's a chronic problem in any industry that's growing fast, but

*Overproduction's
a chronic headache.*

it's more an illusion than a fact, chemical executives feel. Mineral alkalis and chlorine are soft in some areas (notably in Texas "where chlorine producers are out soliciting business"), and a handful of executives admit they're concerned about the number of new fertilizer plants going up in the West . . . but they're all equally convinced the problem will straighten itself out before long.

Giving credence to their belief: inventories in most sectors of the country are normal for this time of the year—some two-thirds of the level maintained last January.

Looming on the horizon as a much bigger problem "if something isn't done by the handful of offenders" is the explosive question of air and water pollution. Big companies in particular complain that they've felt the lash of public indignation, have been forced to spend huge sums of money not only to combat pollution but also to counteract public feeling. "Pollution's a virtual Pandora's box," ruefully states one Southern agricultural chemical president. "From it can spring a whole

slew of evils; once you've been accused of any breach of the law, you're immediately suspect thereafter if any infringements occur."

*Labor has been
quiet too long.*

"Education's the answer to the pollution problem," maintains a New England manufacturer. "We're trying to cope with it . . . but it's sure to be a long campaign."

The advisability of expansion overseas is a serious question . . . but not a headache, management says today. "It comes under the happy classification of things to think about . . . policy decisions to be made."

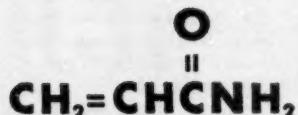
A large segment of the chemical industry has decided to "play it safe," however. States one New York firm: "It's much cheaper and more efficient for us to license an overseas company than to attempt to build our own facilities abroad. Then we're not faced with (1) loss of a large capital investment, if there's a costly patent fight, and (2) oversupply in the event that a foreign market suddenly closes up."

*Growing public awareness
about pollution is sure
to cause trouble.*

Even the everlasting problem of financing expansion plans isn't worrying chemical treasurers as much today as it has in recent months, CW's survey reveals. "Equity shares are still comparatively attractive to the investor," they agree; and debt financing shouldn't get any tighter with the Democrats in the saddle in Washington. Reason: the Democrats will probably be against allowing interest rates to seek their own levels.

It all adds up to a relatively rooseate outlook for 1955.

"From where I sit," sums up a Middle Atlantic president, "only the professional groaners should have much to talk about this year." With a little drive on sales, "and a little push on pollution" most chemical companies should be riding high in 1955.



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→ **Adhesives**—Copolymerization with vinyl formates, vinyl ketones or acrylates gives resins useful as bonding agents for granular materials and abrasives.

→ **Fibers**—Clear, tough, ductile fibers are formed when aqueous thiocyanate solutions of acrylamide-acrylonitrile copolymers are diluted with water.

→ **Graphic Arts**—Thermally-reversible copolymer gels in aqueous media can be used as carriers or protective colloids for the light-sensitive agent in photographic emulsions.

→ **Leather**—Copolymers with butadiene are tough, resinous, thermoplastic materials useful as leather substitutes.

→ **Paper**—Water-soluble polyacrylamide in conjunction with rosin or wax sizes gives improved results in paper sizing.

→ **Plastics**—Molded objects can be prepared from fibrous materials and aqueous dispersions of polyacrylamide.

→ **Plasticizers**—As a flow promoter it imparts toughness, flexibility, high crack and craze resistance, and increased impact strength to thermosetting resins containing a thermoplastic material.

→ **Surface Coatings**—Gives good surface and impregnating compositions for rubber, fabrics, molded articles and metal objects in combination with other materials.

→ **Textiles**—Preparations of polyacrylamide can be used as a smoothing agent for silk, as backing for pile fabrics, and as dressing, non-slipping or waterproofing agents for other fabrics.

→ **Thickening Agents**—Solutions of modified polyacrylamide can be substituted for gum arabic, British gum, starch, dextrin, polyvinyl alcohol and polycarboxylic acid salts to increase viscosity of aqueous solutions or emulsions.

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SAMPLE AND TECHNICAL DATA

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5¢ PATTERN STILL PREVAILS					
Increases provided in recent chemical wage agreements*					
Wage rate increase in cents/hour	District 50, UMW	Chemical Workers (AFL)	Gas-Coke (CIO)	Oil Workers (CIO)	TOTAL
No increase	0	3	4	0	7
1-3¢	4	1	0	0	5
4-6¢	15	7	13	2	37
7-9¢	2	3	4	0	9
10-12¢	1	1	0	0	2
13¢—up	1	0	0	0	1

* As compiled by CW.

Upward, but Shorter Steps

Through this winter, at least, chemical companies will find most local labor unions' wage demands will be hovering in the neighborhood of a 5¢/hour increase—the pattern that has predominated in the industry all this year.

That's the outlook this week, based on these two factors:

- More than 60% of the industry's wage agreements going into effect this autumn have called for pay rises in the 4-6¢ range (see top table); and with economic conditions expected to stay on even keel for the next few months, the unions will have no convincing excuse for trying to up this pattern.

- The CIO's United Auto Workers—a principal pace-setter in national wage drives—has just announced that its 1955 wage goal will be a 5.3¢ increase; and the chemical unions—much smaller and less tightly knit than the UAW—traditionally follow the big unions' lead on wage demands.

But while there won't be much change in the amount of an increase asked for now, new twists are shaping up in other parts of the bargaining picture for the coming season. And though the 5¢ pay boost represents a serious outlay for many chemical concerns, there's some solace for management in the fact that this year's most frequently urged wage demand is the smallest since World War II.

Sudden Endings: It appears that the slow trend toward two-year labor contracts will keep rolling this winter, but that in negotiating such pacts,

unions will try to avoid the consequences of last month's U.S. Supreme Court decision on wage reopeners. The court held that a union does not have the right to strike for higher wages while a contract is in effect, even if the agreement contains a wage reopeners clause.

To get around this ruling, unions are expected to employ these tactics:

- Try to have future wage increases written into agreements; e.g., the recent pact covering 4500 members of United Gas, Coke, & Chem-

ical Workers (CIO) at atomic energy plants in Kentucky and Tennessee calls for an immediate 6¢ wage rise and another 4¢ boost next Jan. 15.

- Bargain for some system of automatic wage increases, based on continuing productivity gains or cost of living index rises.

- If a union fails to get written assurance of future wage increases, then it may seek to have included in the contract a clause stating that the contract is automatically terminated if the union and company disagree about the wage increase to be adopted at the reopeners date. With the contract out of the way, the union then would be free to strike in support of its wage demands.

Relative Letup: Compared with chemical wage increases in preceding years, the current demand is moderate. The lower table shows that the jump in hourly earnings from 1953 to '54 is only about half the rise between 1952 and '53. For the six years between 1947 and '53, hourly earnings in the chemical process industries climbed by an average of 10¢/year, so this year's 5¢ pattern represents a considerable tapering-off.

Whether this tapering-off will continue through 1955 depends, of course, on the general business climate. If business is good and profits run high, unions will be emboldened to play for higher stakes; but if sales are slow and inventories mount up, unions will have to be realistic about the situation. There's no doubt that this year's relatively modest wage de-

TAPERING-OFF TREND

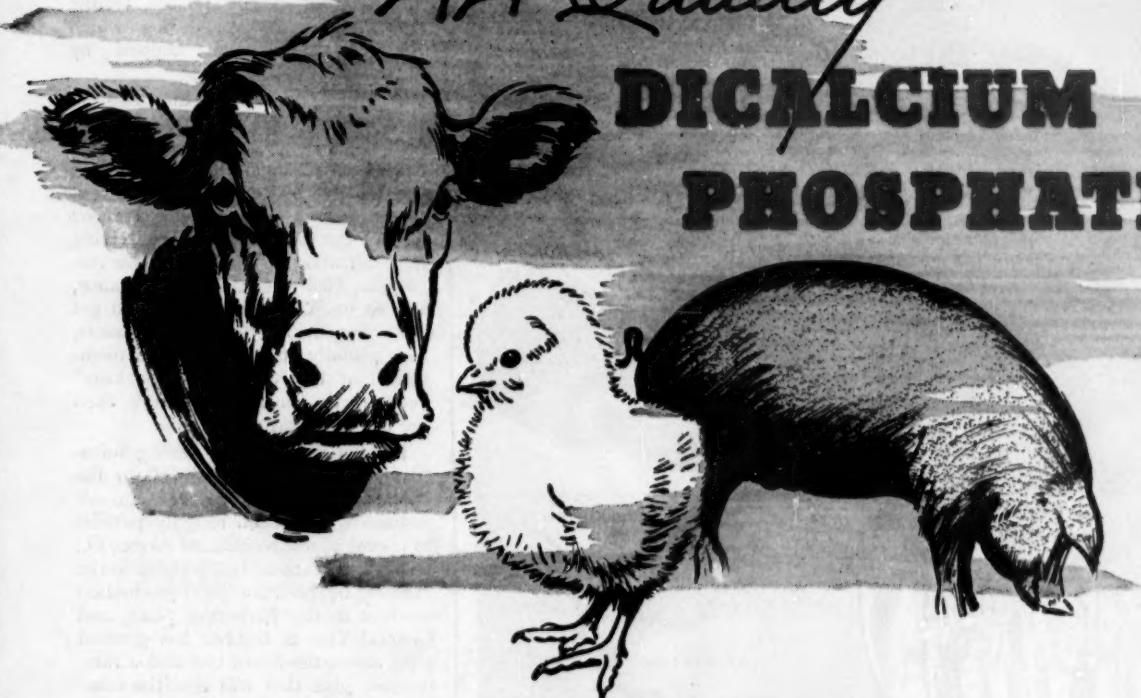
Average hourly earnings in various branches of U. S. chemical industry*

Industry group	Aug. 1952	Aug. 1953	Aug. 1954
ALL CHEMICALS	\$1.73	\$1.86	\$1.92
Alkalies and chlorine	1.88	2.03	2.11
Plastics	1.83	1.97	2.01
Synthetic rubber	2.02	2.18	2.24
Synthetic fibers	1.67	1.77	1.83
Explosives	1.77	1.91	1.96
Drugs and medicines	1.59	1.68	1.75
Soap, cleaning, and polishing preparations	1.80	1.91	2.01
Paints, pigments and fillers	1.72	1.82	1.90
Gum and wood chemicals	1.41	1.54	1.60
Fertilizers	1.36	1.42	1.47
Vegetable and animal oils and fats	1.40	1.52	1.57
Miscellaneous chemicals	1.61	1.71	1.77

* From U. S. Bureau of Labor Statistics figures.

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rock as it comes from our
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PRODUCED
2,000 PLANT
WORKERS
AT THIS
OHIO RIVER
PLANT SITE**



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The first day 2,000 workers applied—at last account, 11,000! Plenty to construct and operate the initial unit of a plant which ultimately will produce 250 million pounds of aluminum sheet and foil annually.

Over a billion dollars recently spent in basic plants, plus this new giant, is ample proof of industry's confidence in the area.

If you have a new plant in the *thinking stage*, you owe it to yourself to look over this area for your requirements. Your new plant plans require proof of plant site potentials! . . . B&O can supply it, with data on resources and markets, and superior transportation to serve you. *We want your plant here.* DESIRABLE SITES! Look them over on the ground, or at your desk with our new airviews plus 3-dimensional color. Ask our man. You can reach him at:

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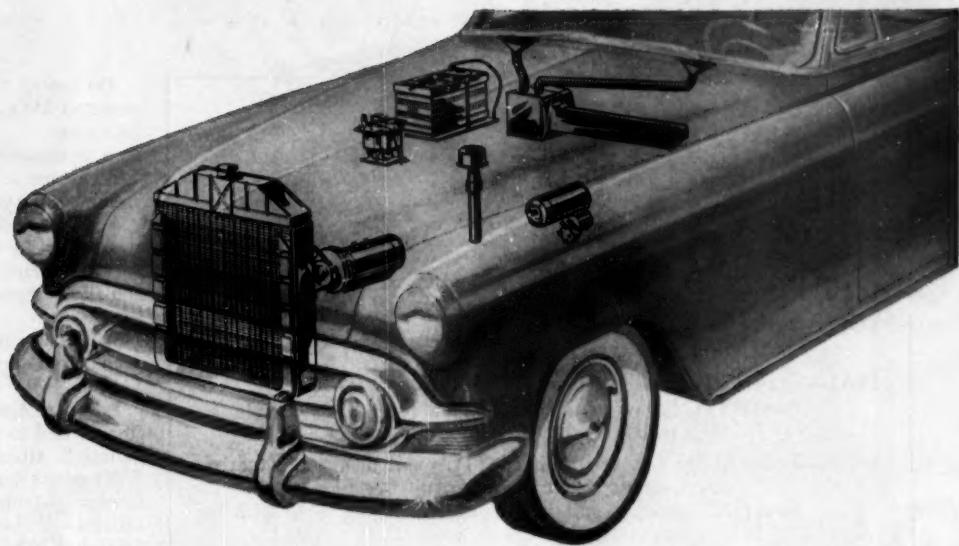
mands were closely related to the readjustment decline, during which chemical employment dipped by about 5%.

Another brake on the rise in straight wages has been the chemical companies' heavy investment in fringe benefits. A recent survey by the Drug, Chemical & Allied Trades Section of the New York Board of Trade shows 95% of the firms surveyed are buying hospitalization insurance for their employees; 86% offer surgical insurance, and so on. Union leaders like to get these benefits written into contracts, then proudly announce to their members that they've won a "package" deal worth considerably more than the rise in actual wages.

Parallel Wage Hikes: Among industries that buy from and sell to the chemical companies, recent wage adjustments have been roughly parallel to chemical settlements. At Akron, O., Seiberling Rubber has boosted wage rates by 6¢/hour for 1400 production workers in the Barberton plant, and General Tire & Rubber has granted a 6¢ across-the-board rise and a rate-revision plan that will cost the company the equivalent of $\frac{1}{2}$ ¢/man-hour. Another 6¢ increase has quashed a strike threat at the Arrow Battery plant in Niagara Falls, N.Y.; Westinghouse Electric and the International Brotherhood of Electrical Workers (AFL) have agreed on a new two-year contract providing for wage and salary increases ranging from 3½¢ to 7¢/hour retroactive to last July 1; and Carborundum Metals Co. is hiking wages by 5¢/hour. A compromise 5% increase has headed off a strike at Climax Molybdenum in Colorado, and Anaconda Copper's new package settlement calls for a 2¢ across-the-board rate increase and other benefits worth an estimated 6½-7½¢/hour.

For the CIO Auto Workers—whose five-year contract with General Motors expires next May—other demands in addition to the one for a 5.3¢ wage rise are for a guaranteed annual wage, a 25% increase in pension benefits, noncontributory financing of health security benefits, higher premium pay for work done on holidays and weekends, and preferential hiring at busy plants of employees laid off at other plants of the same company.

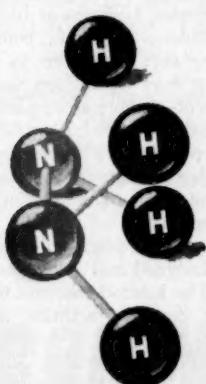
Any of those benefits gained by a large, strong labor union then become goals for smaller unions, including the AFL and CIO chemical unions. Such benefits—although costly enough in themselves—may be used to keep a ceiling on the straight wage demands that'll be forthcoming this winter.



from Hydrazine, improved soldering fluxes

A remarkable new series of soldering fluxes has been developed by McCord Corporation, that makes possible greater economy and efficiency in production of soldered components. Based on compounds of hydrazine, these fluxes, called CORONIL, are non-corrosive and can be used without hazard. They remove oxides and other films from most of the commercially used metals such as copper and brass—as well as others—to permit more effective work and fewer rejects. Currently, these hydrazine-based soldering fluxes are being successfully applied in the manufacture of automotive radiators and other heat exchangers, parts for the electrical and electronic industries, carburetor floats, oil strainers, and various other products where effective non-corrosive soldering is essential.

from Hydrazine, new fields for chemical research



Every day, more and more interesting new applications of hydrazine are being developed. In addition to its use in fluxes, hydrazine is an important component of plant growth regulators, and an effective scavenger of oxygen from boiler feed water. As a chemical capable of reacting with a wide variety of both inorganic and organic materials, hydrazine is the starting point for countless hydronitrogen compounds. Perhaps you would like the latest information on hydrazine and its derivatives and how they might apply to your field of interest . . . if so, why not write today?



OLIN MATHIESON CHEMICAL CORPORATION

Baltimore 3, Maryland

Dates in Tape Tiff

1928—Rado applied for patent in Germany.

1931—3M applied for patent in Germany.

1933—3M applied for patent in U. S.

1935—3M granted patent in Germany.

1939—3M granted patent in U. S.

1947—3M's U. S. patent upheld in 7th Circuit Court of Appeals, Chicago.

1951—May: TTC began production of cellophane tape.
Nov.: TTC brought suit in New York for judgment declaring 3M's patent invalid.

1952—Feb.: Judge Clancy dismissed TTC's suit on ground that no controversy existed when the suit was filed.
Sep.: 3M brought suit in Chicago, charging TTC with infringement.
Dec.: Judge Clancy's dismissal order reversed by 2nd Circuit Court of Appeals, New York.

1953—Apr.: After 4-day trial, Judge Ryan ruled that TTC had proved that controversy existed at time of filing.
Oct.: TTC brought new suit in New York, charging 3M with "unfair monopolizing" of market.

1954—July: 3M's Chicago suit transferred to New York; 3M granted permission to file counterclaim charging infringement.
Sep.: 3M and TTC both asked that early date be set for trial.
Nov.: Trial expected to begin before Thanksgiving.

Transparent Tape, Unclear Lawsuit

Possibly starting this week in Federal District Court, New York, trial of the more than three-year dispute between two rival makers of cellophane tapes looks as though it'll be the chemical industry's hottest court fight of the year.

At issue: validity of the 1939 Drew patent, under which Minnesota Mining & Mfg. Co. has been producing and selling "Scotch" brand cellophane tape. Also challenged by Technical Tape Corp.—maker of "Tuck" brand tapes—is 3M's practice of forbidding its distributors to deal in rival brands.

When the trial begins before Judge Alexander Bicks, TTC will be fighting to hold onto its reported \$1.35-million/year share of the market for these handy tapes. 3M's position will be that its enterprise and investment in research and development work and in advertising and marketing entitle it to full protection of the Drew patent until its expiration date in 1956.

Voluminous Record: Even before the actual trial, quantities of evidence have piled up in this case. Court records accumulated in 3M's separate suit in Chicago—which suit now has been transferred to New York and consolidated with the case brought by TTC

—comprises 14 voluminous affidavits and 12 depositions containing more than 1000 pages, plus numerous physical and documentary exhibits. Papers filed in TTC's earlier suit in New York are already too much for four oversize file envelopes.



WIDE WORLD
JUDGE RYAN: On jurisdiction question, his decision kept case on docket.

On top of all this, Judge Bicks has directed 3M's attorneys to try to bring into court:

- Specimens of representative Scotch tape advertisements published in each of the years 1930 through 1941.
- Pictures of Scotch tape dispensers distributed in each of those years.
- Translations of its adhesive formulation records for each of those years.
- Documents relating to 3M's German patent application No. M 119,867 filed in 1931.

Prior Art Asserted: That last named item is tied to one of TTC's principal claims in attacking the Drew patent. TTC asserts that 31 U.S. patents, eight foreign patents, and four published articles—all bearing dates between 1905 and 1934—constitute evidence of prior knowledge of the art. 3M researcher Richard Gurley Drew applied in 1933 for the patent that's now in dispute.

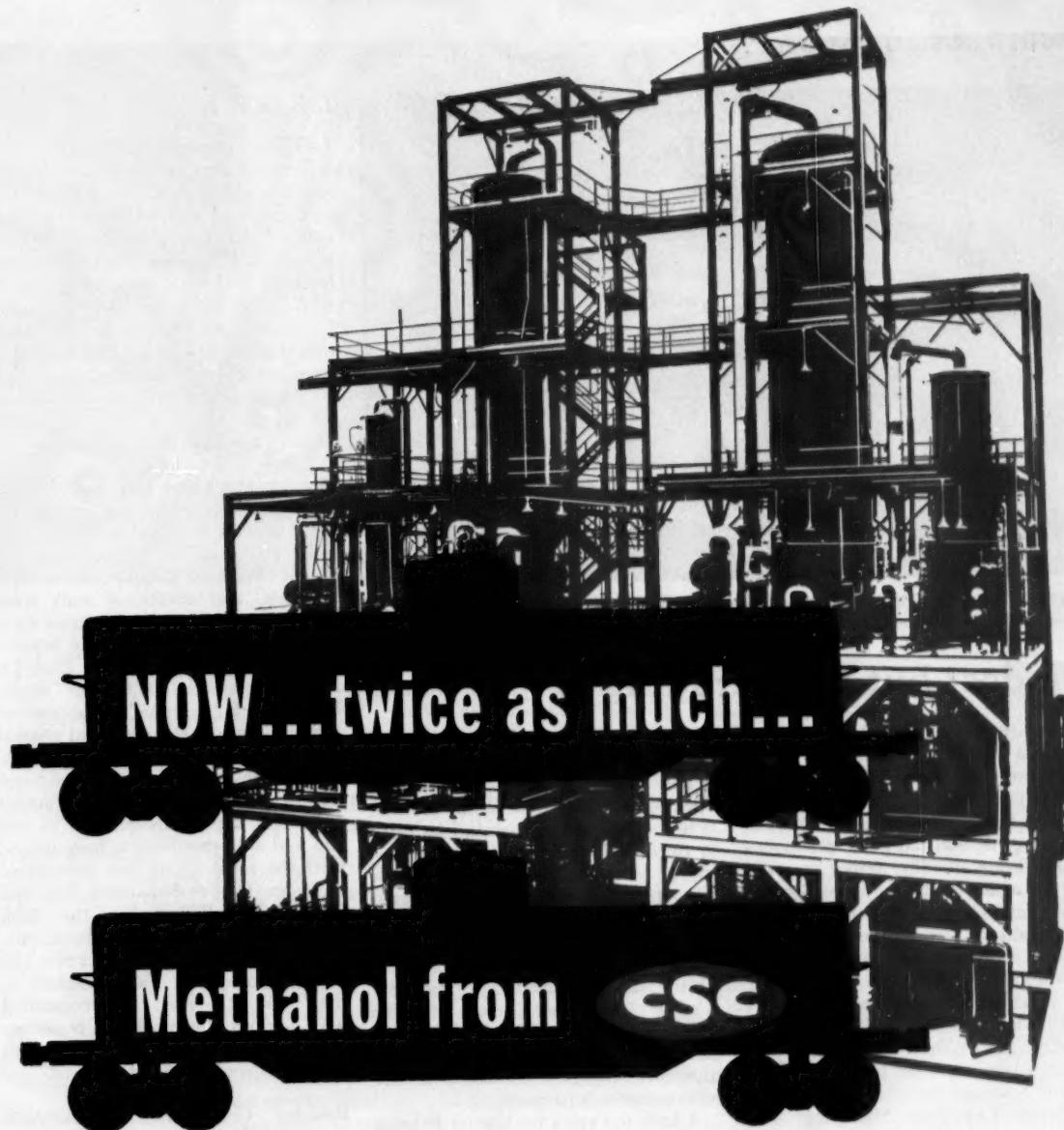
One of the allegedly earlier inventors is Leopold Rado, former German citizen now living in London. TTC says that Rado's 1928 German patent application No. R 76,554 covered substantially the same invention, and quotes Rado as having said that 3M bought an option on that application, then let that option drop and filed its own patent application in that country (see table). 3M denies that the Rado episode is relevant to the current controversy, points to the fact that the Drew patent was upheld in lawsuits against two other companies. It's to be noted that before starting production of Tuck cellophane tape in 1951, TTC offered to pay 3M for permission to make and sell the product in the U.S.—an offer that 3M refused, according to TTC's complaint.

Due for a Build-Up

Stauffer Chemical Co. will expand fertilizer manufacturing facilities at both Vernon and Richmond, Calif., company spokesmen say. First step in a program costing over \$1 million will be taken at Vernon—where a complete new plant (capable of producing 500 tons/day of pelletized superphosphates and other ammonium phosphates) will be built. Completion's scheduled for mid-1955.

First of its kind, the plant will employ a process designed and developed by Stauffer, will be located adjacent to the company's current facilities at Vernon.

Wilson & Geo. Meyer & Co., San Francisco, will act as Stauffer's exclusive sales agent, plans to concentrate its sales efforts West of the Rockies.



Giant, new production facilities are now in full operation at our Sterlington Plant in Louisiana. Basic in methanol for a number of years, CSC can now supply twice as much as it formerly did.

Pioneer in high-pressure synthesis, CSC is ready to serve all American Industry with high-quality synthetic methanol, minimum purity 99.85%, in tank cars, tank trucks, barges, tankers, drums.

Bulk distribution has been expanded to give fast delivery to the Midwest and eastern seaboard. Tank and barge service points have been enlarged and increased in number. Bulk terminal facilities are now maintained at Carteret, N. J., Camden, N. J., New Haven, Conn., New Orleans, La., Chicago, Ill.

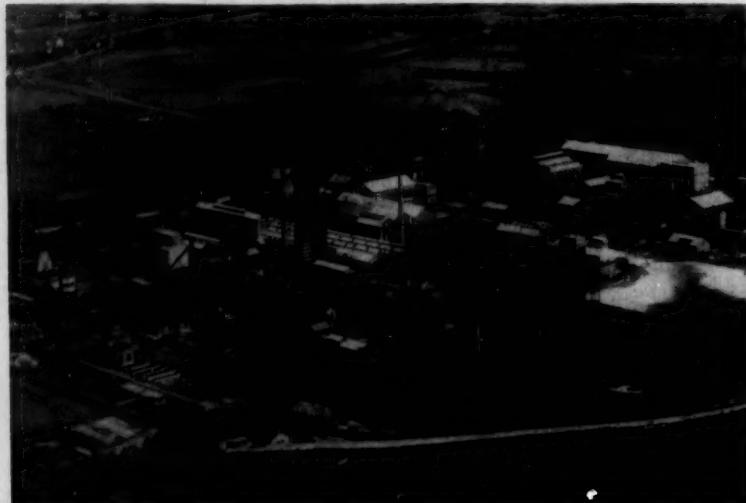


INDUSTRIAL
CHEMICALS

COMMERCIAL SOLVENTS

260 MADISON AVENUE

NEW YORK, N.Y.



ZANDVOORDE: Union Chimique Belge's ammonia, nitrogen, ammonium nitrate units, some of Belgium's largest, now operate at full capacity.

Modest but Encouraging

There are sure signs in Belgium today that the chemical industry has recovered from its late 1952-1953 slump and is well back on the road to prosperity. Production—in most lines of both organic and inorganic products—is increasing steadily; prices are edging up again; and exports (which account for over 50% of Belgium's total chemical sales) are on the rise.

Latest estimates (compiled by the Kredietbank in Brussels) predict that by year's end total chemical exports will be up 12% over 1953 dollarwise; only in the export of explosives will Belgian producers fail to surpass their export earnings by a wide margin.

Heavy Chemicals Steady: Recent recovery is perhaps nowhere more apparent in Belgium today than in the field of heavy chemicals. One of the heaviest-hit sectors in 1952-1953, production is now running at full capacity; most companies report they're taking orders well into mid-1955.

"Orders are coming in now from a host of European and Asiatic countries that placed virtually no orders last year," reports one producer. "There seems to be a general feeling throughout the world now that the general political situation has stabilized; there's less spot buying . . . more long-range planning."

Such prospects are having a salutary effect on the Belgian problem of unemployment too. Unemployment in the chemical industry fell from 5.5% in January to 5.0% in May; a number of large firms say they're "having

trouble now locating both skilled and unskilled laborers."

Few Giants, Many Lilliputians: Specific data as to what actual production is today in the chemical industry in Belgium is difficult, if not impossible to ascertain. Reason: there are a few major companies that release such information, a host of small concerns that don't. Sulfuric acid, for example, is manufactured by 17 companies . . . but three large producers (Union Chimique Belge, Société Belge de l'Azote, and Carbochemique) turn out an estimated 65% of the annual total (roughly estimated at 1.4 million metric tons/year).

Alkalies too are a traditional Belgian specialty—both soda ash and caustic soda being produced and exported in large quantities. But here again the field is dominated by one company (the Solvay organization) . . . which guards its production figures zealously.

Export figures are another question altogether, however. Exports of chemicals and pharmaceuticals (in Belgian francs) are reported annually . . . constitute what observers are prone to call "the best thermometer of business in Belgium."

Prices of chemical shares on the Stock Exchange appear to be following the "better business trend" too. After reaching a high of 226.3 (in Jan. 1952), the index* slid to 160.6 at the beginning of 1953. But today it stands at over 190 again. Altogether a rosy picture for Belgian chemical firms.

* Basis: 1936-38 equals 100.

LEGAL

Lab Site Approved: In Paterson, N.J., Superior Court Judge Robert Davidson has ruled that U.S. Rubber Co. can go ahead and build its \$4 million research laboratory in nearby Wayne township. His ruling blocked the protest suit filed by a group of taxpayers who have been opposed to having industrial establishments in their neighborhood. The Wayne Township Committee had amended the local zoning laws to permit construction of the laboratory on a 100-acre site at Ratzer and Alps Roads.

Firemen Sue Firm: Two civil damage suits have been filed by firemen injured when a 4000-gal. tank of chemicals exploded last month at the Charles W. Berg Laboratories in Philadelphia, and additional suits were expected to follow. Ten firemen were killed and 14 were seriously injured in the blast. In the first suit filed, Lt. Harry Kite asked \$100,000 for "severe burns, shock, poisoning of the nervous system, injury to the eyes, and general abrasions and contusions." His complaint accuses the firm of negligence on 10 counts. Ladderman Thomas Hannigan, reportedly blinded in one eye and suffering from a lung injury, filed the second suit, but amount of damages to be demanded had not been fixed. Reportedly, the tank was a used one that had been purchased from a brewery some 10 months previously. Fatty residues in the tank, it's said, had combined with various chemicals to build up pressures that could not be relieved by a partly clogged safety vent.

Broader Complaint: Ferment-Acid Corp. has broadened its charges in its \$5 million civil suit against Pfizer (CW, Sept. 18, p. 28). Originally, Ferment-Acid charged that Pfizer was illegally using Ferment-Acid's know-how and patented process to make citric acid; in the amended complaint, Pfizer is also accused of using the Szucs fermentation techniques "in the production of antibiotics and other chemical compounds." Pfizer has denied that it appropriated any of the Szucs technology.

Trademark Protection: Du Pont has no intention of letting its "Orlon" trademark slip out of its grasp and fall into common use as a generic name. This is evinced in two suits pending in New York, one against Barclay Woolen Corp. for use of the name "Orlaine" and one against Orlon Fibers, Inc.

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BUSINESS & INDUSTRY



WIDE WORLD
LAWYER KAMMHLZ: Over his nomination, party-line fight looms in Senate.

L A B O R

Prosecutor Politics: The question of who should become the next general counsel of the National Labor Relations Board—the man who initiates and prosecutes actions on alleged unfair labor practices—is a touchy issue in Washington this week. To succeed Democrat George Bott in that position for the four-year term beginning Dec. 21, President Eisenhower has nominated Theophil Kammholz, Chicago attorney known as a conservative Republican. This appointment probably would suit the present Republican-controlled Senate, but the Democrats—who expect to be the majority party when the new Senate organizes in January—say they'll try to prevent consideration of controversial appointments during the current "lame duck" session. It's an open question whether the Kammholz appointment will be ratified; some observers have speculated that Eisenhower may withdraw the nomination.

Happy Days: Latest indication that production and employment are picking up again in the chemical process industries: at Alloy, W. Va., Union Carbide's Electro Metallurgical Co. division has recalled 108 furloughed employees. Plant Superintendent W. W. Jennings says this will bring the plant force back up to 1750.

Merger by March: Delegates of two CIO unions with representation in chemical plants will meet in Cleveland to try to arrange a merger of their groups by March. This move has already been okayed by United Gas, Coke, & Chemical Workers; and the

Oil Workers International Union has set Feb. 25 as the date for its convention. OWIU approval of the unionization is pretty much taken for granted, and if ratification is forthcoming, then delegates from both unions will convene three days for final action.

Chemical executives who'll have to deal with the new union and who are curious about OWIU tactics are watching the Oil Workers' current wage drive. Last June, OWIU's policy committee set up a program for a 5% general wage increase, and included in the plan a pledge not to strike for that increase. Purpose of that pledge, OWIU said, was to meet employers' objections to bargaining under threat of a strike. Since then, only a few small oil companies have granted the wage rise sought; so last week, OWIU dropped the no-strike pledge, urged local unions to keep pressing for the 5% increase.

Plant Votes Ordered: In two Southern plants, NLRB has just ordered that elections be held to determine collective bargaining representation.

- Denying the company's claim that its employees are "agricultural laborers" and that it's exempt from federal labor law as a nonprofit cooperative, NLRB directed that an election be held at the Mississippi Chemical plant in Yazoo City, Miss., by Dec. 9. Employees will choose between CIO's Gas-Coke and "no union."

- Two separate elections—one for production workers, one for maintenance employees—are to be held at the Reynolds Metals Co.'s parts division plant at Sheffield, Ala. However, the board ruled that about two-thirds of the total plant force are technical employees and must be excluded from both units.

Labor Session: Welfare funds, secondary boycotts, NLRB policies and possible new labor legislation will be among principal topics at the National Industrial Relations Conference to be held Jan. 27 at Dayton, Ohio. Sponsors are the Chamber of Commerce of the U.S., the Ohio State Chamber, and the Dayton Chamber of Commerce. Secretary of Labor James Mitchell will head the list of speakers; his subject: "Development of Sound Industrial Relations."

Right to Work: So far this month, advocates of state-wide "right-to-work" laws have been victorious. In Nevada, voters turned down the measure to repeal that state's law; and in Louisiana, the new right-to-work law was upheld in its first court test.

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COPPER CLIFF, ONT.: Site of International Nickel's new iron ore plant.

FOREIGN . . .

Iron Ore/Canada: Steel erection has started for International Nickel Co.'s iron ore plant near Copper Cliff, Ont. The plant (whose 637-ft. chimney is largest in the British Commonwealth) will use an atmospheric pressure ammonia leaching process.

Lubricating Oils/Argentina: Diadema Argentina, S.A. de Petroleo (a subsidiary of Dutch Shell), has just brought a new lubricating oils plant onstream in Buenos Aires. Credited with being the first plant in Argentina to use the furfural extraction process, it will have a daily capacity of 100 tons of oils of all grades.

Petrochemicals/West Germany: West German industrialists expect that their country's petrochemical industry will take giant strides within the next few years. First new production expected onstream: Rheinische Olefinwerke's polyethylene plant at Wesseling (near Cologne)—a project jointly sponsored by Shell Oil Co., and Badische Anilin- & Soda-Fabrik. Since West German domestic requirements of polyethylene are estimated at between 10,000 and 14,000 tons annually, the Rheinische works should be able to supply domestic needs, still have polyethylene available for export.

Nor is that all that's happening to West Germany's petrochemical industry. In the Upper Rhine Valley, petrochemicals are being produced from natural gas from the oil fields

near Darmstadt by Farbwerke Hoechst. Gas is supplied by pipeline to Farbwerke's plant, which is using it to produce chloroform, methyl chloride, carbon tetrachloride, etc. And at the beginning of 1955, gas from the same fields will be supplied to Badische Anilin—for conversion into a host of other chemicals.

Stock Offer/Italy: A loan of 50 million Swiss francs to Montecatini, Italy, will be offered for public subscription on the Swiss market by a Swiss banking group. According to latest reports, the loan will be issued at 99%, carry 4½% interest, and will be repayable after 12 years.

Petrochemicals/Australia: A new company—to be called Shell Chemical (Australia) Proprietary Ltd.—has been incorporated in Australia to control Shell interest in the Australian chemical industry. Headquarters will be Melbourne.

Soda/Bulgaria: Bulgaria's recently opened Karl Marx Chemical Works will be able to satisfy all of the nation's soda requirements by the end of 1954, according to the official Russian mouthpiece, *Izvestia*. Situated in east Bulgaria, south of the Dali Orman Hills, the Karl Marx plant is Bulgaria's second-largest chemical unit, being exceeded in size only by the Stalid combine at Dimitrovgrad.

Canada-U.S. Exchange: Abitibi Power & Paper Co., Ltd., Toronto, has concluded arrangements with Rayonier, Inc., New York, whereby Abitibi and the Koerner interests of Vancouver, B.C., will sell to Rayonier the majority of their holdings of Alaska Pine & Cellulose Ltd. common stock. A total of 80,000 shares of AP&P stock is involved in the transaction. Value: over \$20 million. Both Abitibi and Koerner will retain substantial stock holdings in AP&P, however; no change in present operating management is contemplated.

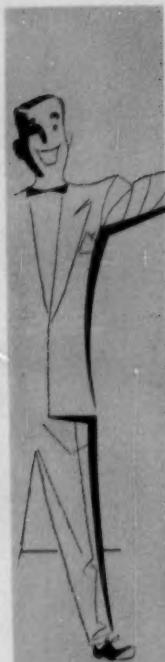
Japanese-East German Trade: A group of Japanese trade firms is negotiating direct imports of East German potash on a barter basis. Spokesmen of the Committee for Promotion of International Trade (an organization formed last September to secure expansion of trade between Japan and Communist countries) say the exchange will involve over 100,000 metric tons of potash annually, will be the first direct barter deal consummated between Japanese businessmen and East German trade authorities.



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B & I

Century Look-Ahead

Olin Mathieson Chemical Corp.—a company not yet three months old as a corporate entity—sold \$126 million in 100-year notes last week to Prudential Insurance Co. of America. The financing, company officials maintain, is the first in a series of steps designed to furnish capital "for growth and expansion" of the recently merged combine.

The issue, convertible under certain conditions into shorter maturities, will not affect an existing three-year standby agreement with Prudential for the purchase of an additional \$42 million of long-term notes, and does not require sinking fund provisions unless it is converted into shorter maturities. Amortization won't start until after 1965; interest rate has not been disclosed.

For the moment, Olin Mathieson will use the \$126 million to retire a like amount of 20- and 25-year notes now held by three other creditors. But, spokesmen emphasize, this is simply a preliminary move to free other capital for expansion expenditures.

KEY CHANGES . . .

James J. Minot, and Philip L. Reed, to directors, and Hugh S. Ferguson to vice-president, W. R. Grace & Co., New York City.

Charles E. Brooker, to sales manager, Food Industries Dept., Pennsylvania Salt Manufacturing Co., Philadelphia.

Jason D. Radding, to general sales manager, Veon Chemical Corp., Long Island City, N.Y.

Charles K. Piercy, to domestic sales manager, Lederle Laboratories Div., American Cyanamid Co., Pearl River, N.Y.

James E. Sayre, to manager, market research, Barrett Div., Allied Chemical & Dye Corp., New York City.

Breckinridge K. Tremaine, to technical director, Industrial Reodorant Div., Rhodia, Inc., New York City.

Maxwell James, to manager, wholesale sales, Lederle Laboratories Div., American Cyanamid Co., New York City.

O. G. Kennedy, to director, Lehn & Fink Products Corp., Bloomfield, N.J.

Simon Askin, to president and director, Nuodex Chemical Corp., Elizabeth, N.J.

Harold A. Swanson, to assistant vice-president, Vitamin Div., Nopco Chemical Co., Harrison, N.J.

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GIRDLER has built the carbon dioxide removal plant shown above for use in the U.S.S. *Nautilus*, the first atomic-powered submarine. As air is circulated through the unit, it contacts a counter-current stream of liquid absorbent, which extracts carbon dioxide. Continuous reactivation and recycling of the absorbent insures a non-toxic atmosphere.

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Plastics Materials Plants	Carbon
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Laundries and textile manufacturers have one problem in common—providing their fabrics with a soft finish. Whether it's a new fabric being sold to a textile buyer or a towel coming back from a laundry, it must look and feel soft.

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And Arquad 2HT is just as effective in the home laundry. Supplied as a concentrated dispersion of distearyl dimethyl quaternary ammonium chloride, you merely dilute with water and package for the consumer market.

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If you manufacture cosmetics, shaving creams or other products which must stay fresh, it will pay to investigate this new triple pressed stearic. Samples of Neo-Fat 18-55 are available free; simply mail the coupon.

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ARMOUR CHEMICAL DIVISION

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Roundup of new chemicals

Several new chemicals have been offered in this column over the last several months. You may have missed some of these new products. To bring you up-to-date, a brief summary of these developmental chemicals follows.

Armeen 2S and Armeen 2T—new (unsaturated) secondary amines, of particular interest in corrosion inhibition problems in oil systems.

Arquad 2S and Arquad 2T—quaternary ammonium salts of the above amines, useful in corrosion problems and as cationic emulsifiers and anti-static agents.

Armeen DMS and Armeen DM18—new tertiary amines (dimethyl soya and dimethyl stearyl) for evaluation in the fields of sanitation, textile chemicals, and corrosion inhibition.

N-coco morpholine and N-tallow morpholine—tertiary amines, useful in general emulsification problems, corrosion inhibition and the sanitation fields.

Ethboduomeen T/13—a tertiary amine, useful to the petroleum industry for specialized corrosion problems.

N-coco B amino butyric acid—an amphoteric amine derivative, the salts of which make excellent detergent additives as foam boosters and stabilizers.

Further technical information and samples of these new chemicals can be obtained from the Market Development Dept.

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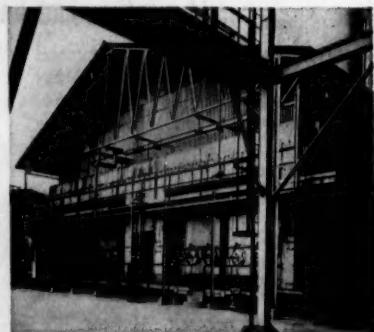
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by Frank E. Dolian and Walter C. Gwinner

What's in Store for Methanol

Although production capacity for methanol should outpace demand for the next few years . . .

New uses and diversion to new forms of formaldehyde should close the gap in a reasonable time.

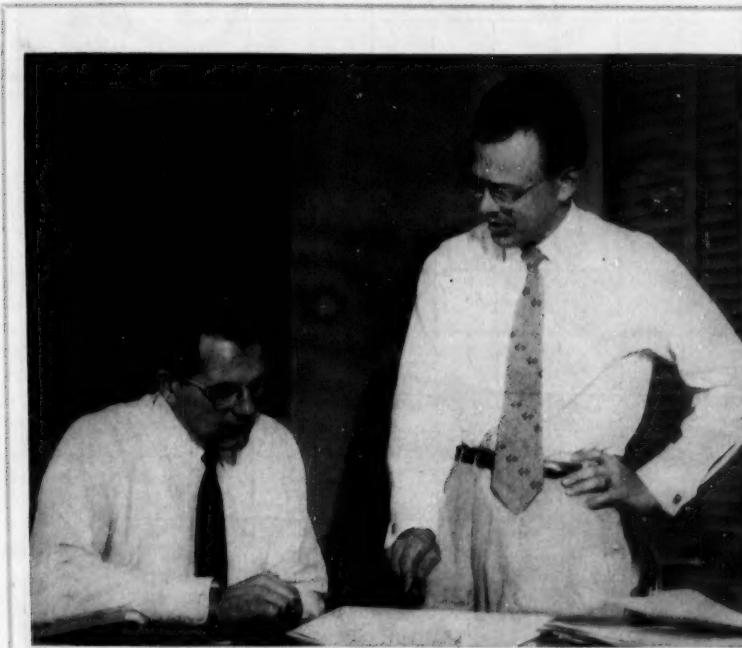
Here's how the picture looks today and where the prospects for growth lie.

It's not too difficult to portray a dreary outlook for methanol. As an anti-freeze, historically one of its biggest outlets, it's been steadily losing popularity to the nonvolatile type. What's

more, producers are still going ahead with ambitious plans to fulfill the 226 million gal./year goal set by the Defense Production Administration for 1955. Meanwhile, production this

year is expected to dip to 163 million gal. The seemingly obvious conclusion: there'll be enough methanol left over to float a fair-size fleet.

But that's like losing sight of the forest by concentrating too hard on the trees. Here's why: it's always easy to get trapped into a wrong conclusion by paying too much attention to the rises and falls, the year-to-year fluctuations on a supply-demand chart. The only way to put it in perspective is to stand back and take the gauge of the whole situation.



Meet the Authors

FRANK DOLIAN (*left*), senior member of this Commercial Solvents team, is head of the firm's Market Development Dept. relating to its petrochemical activities. With time out for a four-year stint in the Army, he's been with the company since 1933. About six of his 21 years' experience have been spent in chemical research.

Walt Gwinner (*right*) has approximately 10 years' experience with process industries, has been doing market research for CSC for four and a half years. He's now supervisor of market research in the Market Development Dept.

When you do that with methanol, you're bound to see that although there may be a temporary oversupply, the products that require it have growth potential sufficient to absorb the excess capacity within a reasonable period of time.

Where It's Used

Major uses of methanol, in order of importance (see *End Use Pattern*) are as a raw material for formaldehyde, as an antifreeze, and in chemical synthesis.

Dual Role: Methanol is needed not only as a raw material for formaldehyde, but also as an inhibitor for formaldehyde solutions. And a detailed analysis of the various end use requirements for formaldehyde reveals that U.S. consumption this year

should be in the neighborhood of 1.2 billion lbs. This is how that figure translates into methanol demand:

- Not all the formaldehyde produced requires methanol; for two producers (Cities Service and Celanese) make it by the direct oxidation of hydrocarbons and a third (Warren Petroleum) plans to start continuous production by a similar process before the year is out. Subtraction of the formaldehyde made in that way leaves a demand for about 73.5 million gal. of methanol.

- Formaldehyde is sold in three grades: an inhibited one containing 7-8% methanol, an uninhibited one that runs 2% methanol or less, and a specially inhibited grade that contains 12-14% methanol. Since the resin industry, the largest consumer, normally prefers the uninhibited grade for cost reasons, the average (based on actual sales of formaldehyde solutions) comes to only 3.5% by weight. That means a methanol demand of 5.5 million gal., or a total formaldehyde demand for methanol of 79 million gal.

So close have the fortunes of methanol been tied to formaldehyde that slopes of the trend lines for the

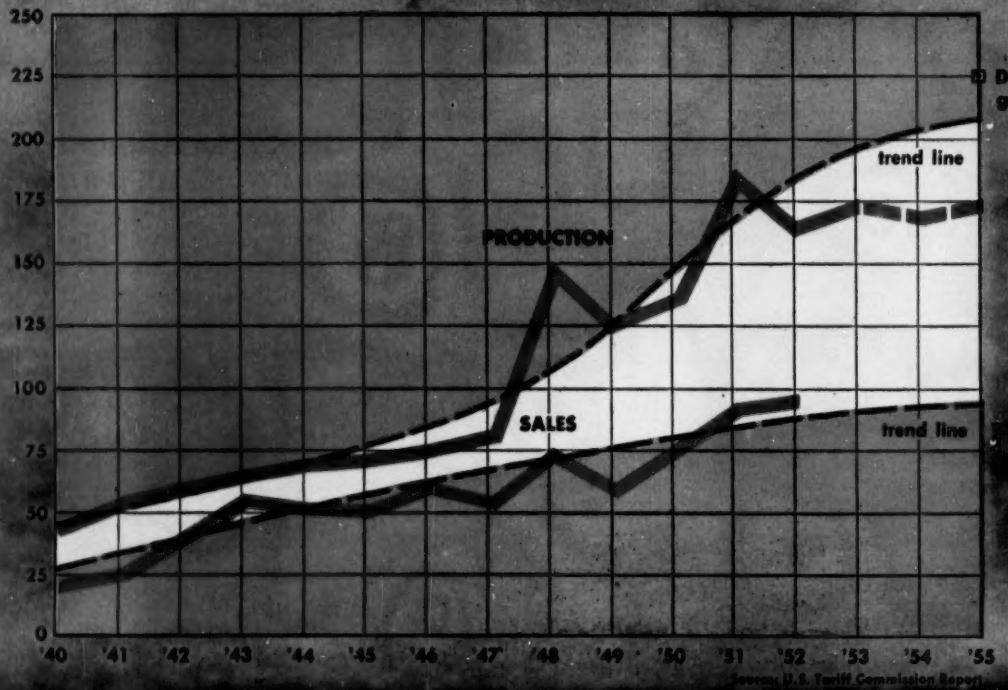
production curves of both are almost identical. Thus the slight dip in production of methanol this year reflects in part the 8-10% decline in formaldehyde demand. In fact, the slackened demand for methanol was the end of a chain reaction brought on by the lowered production of radio and television cabinets along with other large-volume consumer durables that are heavy customers for phenol-formaldehyde molding powders.

Out in the Cold: The second biggest consumer of methanol is antifreeze, which takes approximately 28% of the total. Consumption of antifreeze, however, is very difficult to pinpoint. The National Production Authority in 1951 reported antifreeze use for that year at 98,640,000 gal. At that time, the total vehicle* registration was 51,948,806. The average consumption per vehicle therefore should be 1.9 gal. But this figure is probably higher than the present level; spot checks in various marketing areas indicate that 1.5 gal. for each passenger car is a much more reliable figure.

In addition to the antifreeze re-

* Includes passenger cars, buses and motor trucks privately and publicly owned; excludes military vehicles. Source: U.S. Bureau of Public Roads.

Methanol production and sales





What's Alcan doing in Chemicals?

AS THE PRODUCER of one-fourth of the free world's aluminum, Alcan (Aluminum Company of Canada, Ltd.) is concerned with chemicals in a big way. With a large range of metallic and non-metallic products, evolving from the production of aluminum, Alcan is in a position to supply chemicals to industry for a variety of uses.

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- Mining and processing of raw materials in many different countries;
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One of Alcan's sister companies, Aluminum Limited Sales, Inc., distributes Alcan Chemicals in the United States. The office near you will be glad to help you with your special chemical requirements.



Aluminum Chemicals

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Bauxite
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Cryolite, Artificial
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quired for automotive use, substantial quantities are needed for "off-the-road" equipment like farm and contractors' machinery. Reliable estimates place antifreeze requirements for these at between 5 and 10% of the total.

The difficulty in figuring the methanol requirements for antifreeze is further compounded by the fact that it's hard to determine the ratio of volatiles to nonvolatiles, also that some motorists use the nonvolatile type for more than one season. But the consensus of antifreeze makers is that the volatile type now accounts for approximately 40-45% of the total market.

Assuming the lower figure (1.5 gal.) for antifreeze consumption and adding 7% (for off-the-road equip-

ment) to the estimated vehicular registration (56.8 million) for 1955, it's probable that the total market for antifreeze will be 91 million gal. The higher figure (1.9 gal.) indicates a total market of 115 million gal. Even if the methanol share should drop to 35%, the antifreeze requirements (see graph, *Estimated Antifreeze Consumption*) should be between 31.8 and 40.3 million gal. A difference in antifreeze consumption of only 0.1 gal. per car, of course, changes the total antifreeze consumption by approximately 5 million gal.

Chemical Climb: In 1954, the production of methylamines will need about 7.0 million gal. of methanol, all other chemical uses will take about 7.0 million gal. Approximately 2.2 million gal. of methanol are required to produce 10 million lbs. of the former. The figures for this year are predicated on a 31-32-million-lb./year market in 1954. The expected 33-million-lb. market in 1955 will hike the methanol demand only slightly—to 7.3 million gal.

Other chemicals that consume more than 100,000 gal. of methanol yearly are also shown (see *Methanol Used as Chemical Derivative*). Some of the

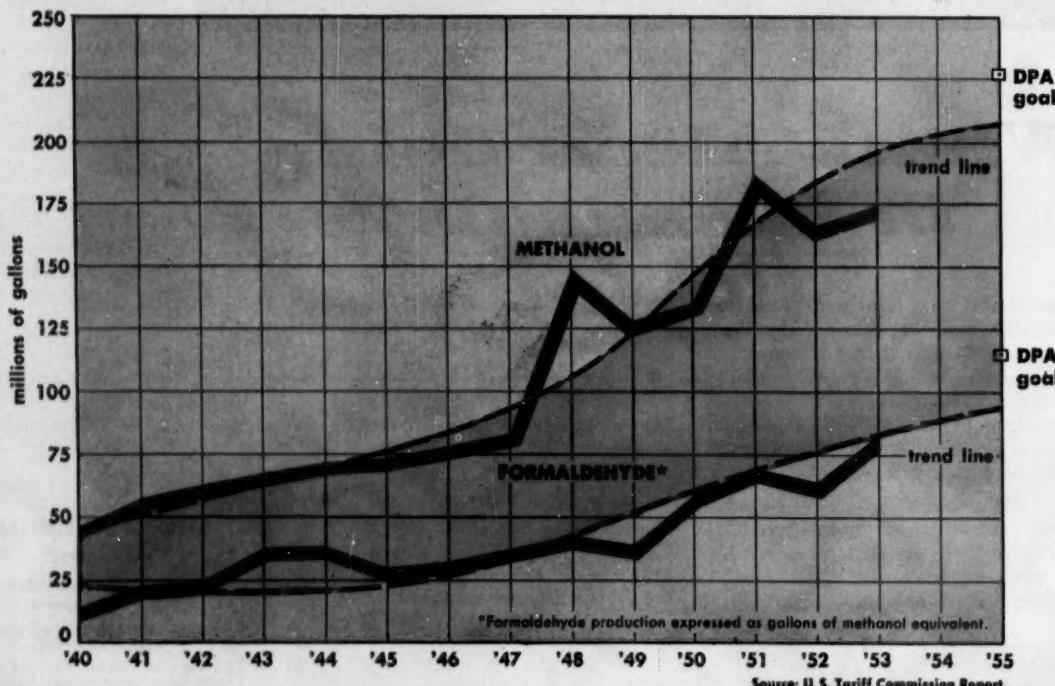
figures, however, are based on DPA goals and, as a result, may be optimistic. A raft of other chemicals—like sodium methylate, methyl sulfate, and methyl *p*-hydroxybenzoate—depend on methanol, too. But it's impossible to establish exact requirements since production figures are not reported for such small-volume chemicals.

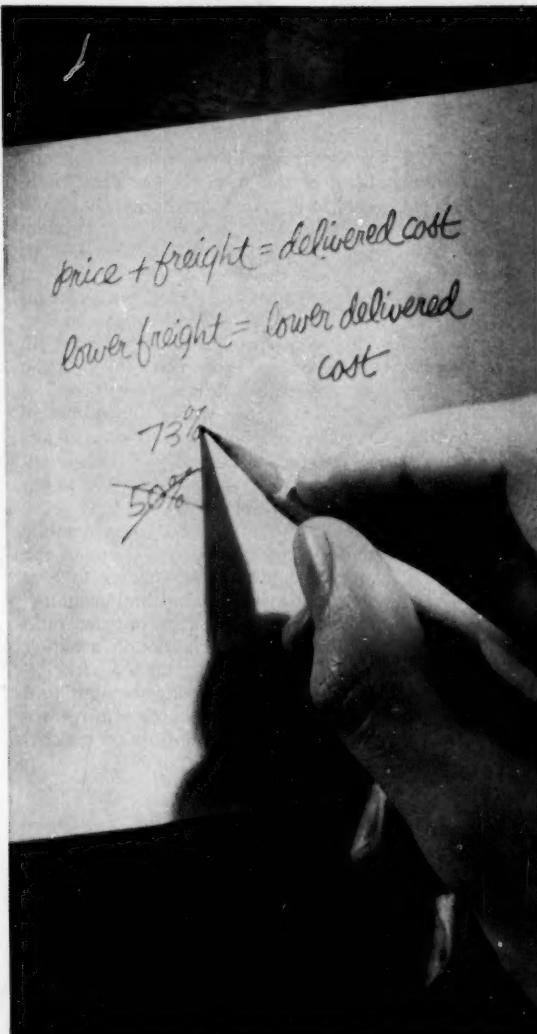
Three Take 14: Three other uses—in aviation, as a denaturant and as a solvent—will probably account for 14.3 million gal. of methanol this year:

- Solvent uses for methanol include chemical processing, surface-coating products and others. Some of the bigger applications are nongrain-raising stains for wood finishing and the Unisol process of refining petroleum. All solvent uses will probably require 10-11 million gal. this year.

- Methanol is used by both jet and conventional aircraft. The jet application—like the jets themselves—is relatively new. Most of the sales thus far, in fact, have been to aircraft manufacturers for testing purposes. At the same time, it's a very promising outlet for methanol. From 10 to 50 gal. are required per takeoff and it's likely that requirements for this purpose could be substantial in years ahead. In 1952,

Production of methanol and formaldehyde





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for instance (a peak year for jet-engine testing), an estimated 5 million gal. were used.

In conventional aircraft, methanol is used for water injection* during takeoff periods and for deicing. This moderate-size outlet is not apt to increase appreciably by 1955 or beyond.

• As a denaturant for ethyl alcohol, methanol is specified in the government's SDA-3A and SDA-30 formulas. The former takes 5 gal. of synthetic methanol per 100 gal. of ethanol while the latter takes 10 gal. Reports by the Alcohol & Tobacco Tax Unit of the Dept. of Internal Revenue Service pin this application down at 750,000 gal., a level that probably

*A mixture of methanol and water is injected into a piston engine during periods of heavy loads to help reduce the tendency to knock, thus give the engine more power.

won't change to any great extent.

Completing the Pattern: During the past 10 years, methanol has not been imported into this country*; exports have been moderate. The major market outside the U.S. has been Canada; about 1.7 million gal.—almost 65% of the total exports—were shipped there during 1953. Canadian chemical growth in general and formaldehyde and pentaerythritol in particular indicate that it will continue to be a good customer for U.S. methanol.

Miscellaneous uses for methanol are estimated at 4-5% of annual production; and inventory build-up during 1954 will account for a small portion of the output. This increase in inventory is expected in view of the drop in demand from 1953 and the wide fluctuations in the production of the many chemicals based on methanol.

Where It's Headed

Unless a national emergency develops, it seems probable that methanol capacity will run ahead of requirements during the next several years. However, the new uses for methanol

and diversion of methanol on the part of the producers to other derivatives will aid the chemical industry in utilizing capacity that's in place by that time. Very likely, in fact, additional capacity after 1955 will be required.

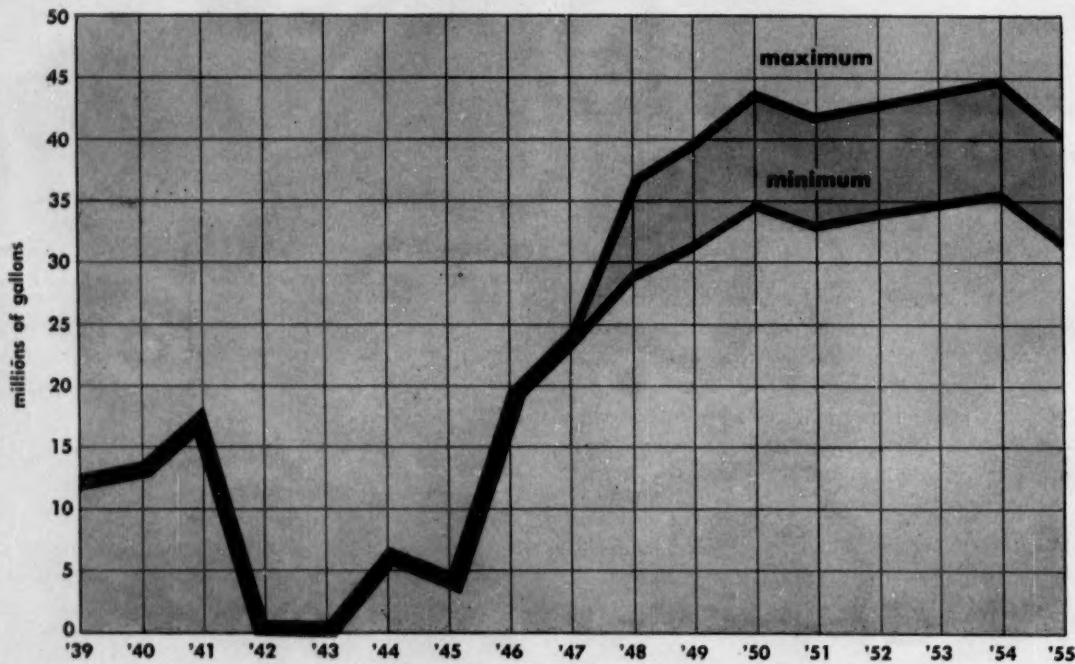
New Fields: One of the most promising of the newer outlets for methanol is in jet engines. Used as a 30% solution in water (when the ambient temperature is above 32 F) it helps increase the density of the exhaust gas during the takeoff period, thus provides greater thrust for the engine. This same principle applies to both the new axial compressor jets and the older centrifugal compressor type.

Although the outlet for methanol in water injection for conventional aircraft is not expected to broaden appreciably, the same idea has a big potential in the automotive field.

Here's why: the trend in automobile manufacture has been to increase the compression ratio of engines to give better performance and fuel economy. This increase in the compression ratio of engines, of course, entails a higher octane gasoline to reduce knock.

But the octane rating depends to a large extent on the source of the gasoline and the addition of tetraethyl

Methanol antifreeze consumption



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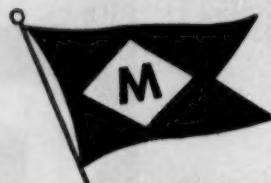
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C W Report

lead. And since there's an upper limit to the quantity of TEL that can be added, it is reasonable to expect that water injection will be employed in future automobile engines.

Formaldehyde Diversion: An increasingly popular means of diversifying methanol sales is to divert a portion of it to formaldehyde manufacture; right now most of the major producers do just that. Unfortunately, this does not add greatly to methanol profits; increased sales of formaldehyde by an integrated methanol-formaldehyde producer can actually result in a corresponding reduction in its sales of methanol to other formaldehyde makers.

Some producers go a step farther to improve the methanol-formaldehyde situation by converting methanol into special forms of formaldehyde. Examples of these are a low-molecular-weight linear polymer (paraformaldehyde), along with higher polymers and cyclic forms like trioxane.

Certain of these special forms have technical advantages that, for some resin applications, give them a better competitive sales position. And trioxane—not used in resins—is finding favor as a solid fuel.

In addition to the solid forms of formaldehyde, special solutions are diverting methanol production, like

the 44-50% aqueous, alcoholic, and formaldehyde-urea solutions.

But as yet, none of these special forms of formaldehyde has succeeded in opening up any broad new markets for methanol. All they're doing right now is replacing an equivalent amount of formalin. But by the same token,

Methanol Producers and Plants

Company	Location
Allied Chemical & Dye	South Point, O.
Celanese	Pampa, Tex.
Commercial Solvents	Bishop, Tex.
Cities Service	Sterlington, La.
Du Pont	Tallant, Okla.
Olin Mathieson	Orange, Tex.
	Morgantown, W. Va.
Monsanto-Heyden*	Texas City, Tex.
Spencer Chemical	Military, Kan.
Stanolind Oil and Gas*	Brownsville, Tex.
Carbide and Carbon	South Charleston, W. Va.
	Texas City, Tex.
Warren Petroleum†	Houston, Tex.

*Production is expected or possible in 1955.

†Production is scheduled to start up late this year.

they will tend to grow, as will formaldehyde, with the urea and melamine resin industries. Such technical gains as phenol-formaldehyde resins for shell molding, waste wood binding and metallic-coated plastics indicate that these applications will consume ever-increasing quantities of formaldehyde resins.

Chemical Diversion: A third means

End Use Pattern for Methanol-1954

Use	Millions of gallons	Percentage
Formaldehyde	79.0	48.5
Antifreeze	45.4	27.8
Chemical Synthesis	14.0	8.6
Solvent, aviation and denaturants applications	14.3	8.8
Exports, inventory build-ups, miscellaneous	10.3	6.3
	163	100

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of outside sources of supply. Specially engineered processes produce organic chemicals to meet a broad range of industrial specifications—in forms most adaptable to high speed manufacture of finished goods—in the continuous volume demanded today.

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Alcohols	Glycols	Polyols
Aldehydes	Ketones	Salts
Anhydrides	Oxides	Solvents
	Hydraulic Fluids	

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C W Report

small-volume chemical to attain tonnage output.

Who Makes It

At present, methanol is made by eight companies in ten plants. Within one year, two additional firms are scheduled to start production and a third (Stanolind Oil and Gas) is expected to renew operations discontinued during 1953. Allied Chemical and Spencer, although they had been considering additional methanol plants, have deferred construction.

As shown in the accompanying chart, production hit 185 million gal. in 1951, an all-time high. Although it's been falling off slightly ever since, the trend line shows evidence of a decided perking-up. The other significant trend brought out in the chart is the widening of the gap between production and sales, indicative of the increased popularity of captive uses.

Methanol has indicated a rather striking stability in price. Back in 1933 the price was 35¢/gal. Its low was the period from 1943 to 1948, when it was selling for roughly 24¢/gal. Price increases during 1948 and again during 1951 were occasioned by a temporary shortage.

In the event of another national emergency, the price, of course, would likely rise again and the gap between capacity and demand would soon disappear. But methanol producers are probably better set for such an emergency than at any time in history. And barring such a development, they're confident that the new uses and the anticipated growth of the steady customers of the past will keep any "standby" capacity "active."

Estimate of Methanol Used for Chemical Derivatives

(millions of gallons)

Chemical	1953	1954	1955
Methylamines	6.6	7.0	7.3
Methyl chloride ¹	3.1	3.2	3.4
Methyl methacrylate	2.5	2.6	2.5
Methyl mercaptan	0.3	0.5	0.5
Dimethyl mercaptan	0.3	0.5	0.3
Methyl salicylate	0.1	0.1	0.1
Dimethyl phthalate	0.1	0.1	0.1
Methylene chloride ²	—	0.2	0.3
Total	13.0	14.0	14.5

¹Estimated 60% from methanol

²Major production from methane; small portion from methanol.

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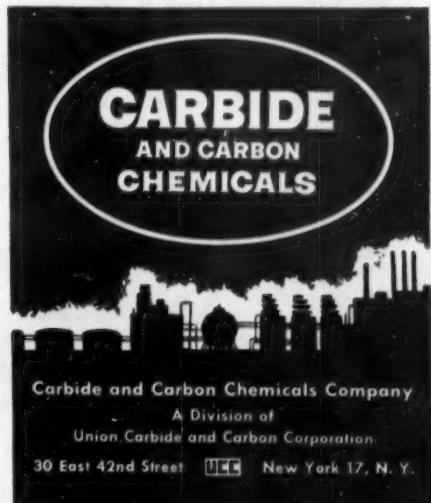
...solubilizers for casein

Try these isopropanolamines, too, in making preferred soaps for emulsifying "soluble" mineral oils. For additional information on these isopropanolamines and how they can make money for you write for technical data or consult a CARBIDE Technical Representative. Offices are located in 23 principal cities. In Canada: Carbide Chemicals Sales Company, Division of Union Carbide Canada Limited, Toronto.



In Addition -

to these four isopropanolamines, you can get more than 80 other nitrogen compounds from CARBIDE. Among these products are mono-, di-, and tri- ethanolamines; dimethyl and diethyl ethanolamines and six morpholines. Write for technical data on these profit-making products.





ATLAS

CHEMICALS DEPARTMENT
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ATLAS POWDER COMPANY, CANADA, LTD., BRANTFORD, CANADA

HLB Method Saves Lab Work in Choosing Surfactants

Up to the early 1930's, emulsion formulators had few problems in selecting a surfactant. For the great majority of formulas, soap was the most widely used surface active material. In recent years, the number of available surfactants has been enormously multiplied, to better meet the problems of formulating newly-developed emulsion products. Today, the chemist is confronted with the tremendous task of picking from this ever-growing group the compound or blend that will exactly fit his particular formula.

The need for a quantitative method to classify surfactants and to predict their behavior has become more acute with the advent of each new surfactant developed. After extensive experience with surfactant applications, Atlas developed such a method—the HLB System.

What the HLB System is

The HLB System establishes a numerical scale by which surfactants and emulsions can be readily compared. It is developed from the rela-

tionship between the behavior of a surfactant and its solubility in water. Chemists have noted for some time that a water-soluble surfactant generally proves most applicable to making an oil-in-water emulsion. Conversely, an oil-soluble surfactant would be the answer to dispersing water into an oil.

Non-ionic surfactants contain in their molecular structure both hydrophilic (water-loving) and lipophilic (oil-loving) groups. When the hydrophilic groups predominate, the surfactant is water-soluble. Large lipophilic groups make the surfactant oil-soluble. In each surfactant, there is a definite balance between these two types of groups.

The HLB number assigned to a surfactant measures the relative strength and size of the hydrophilic and lipophilic groups. On the Atlas HLB scale, the HLB value is a function of the weight percentage of the hydrophilic portion of the molecule.

How HLB is determined

The HLB value for any non-ionic

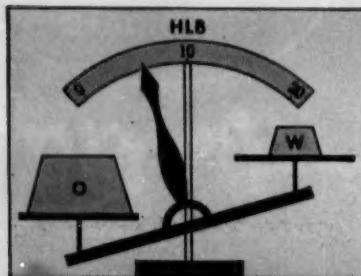
surfactant can be determined experimentally, by a long and laborious procedure. For many basic types of surfactants, however, HLB can be calculated from analytical data by means of empirical formulas developed by Atlas.

If the surfactant is a polyhydric alcohol fatty acid ester, for example, HLB can be calculated from the saponification number of the ester and the acid number of the acid. Where ethylene oxide is the hydrophilic portion, HLB calculation is based on the weight percentage of oxyethylene.

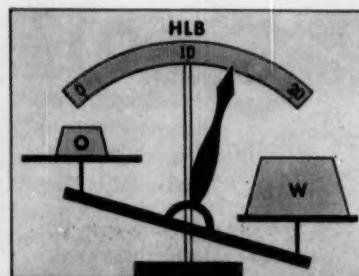
Formulas of this nature give close agreement with experimental data for most non-ions. In the case of ionic surfactants, calculated HLB values do not follow a weight percentage basis, and the experimental method must be used.

How to use the HLB System

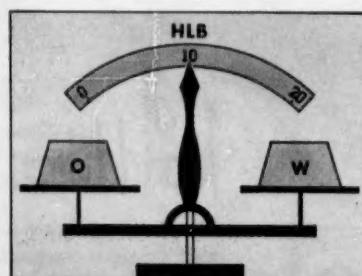
Just as each surfactant has its HLB value, each emulsion has a "required HLB"—that is, the value which is needed to give desirable emulsifica-



When oil-loving groups in surfactant are predominant, HLB is low . . . for producing water-in-oil emulsions.



When water-loving groups predominate, the surfactant has high HLB and is used for oil-in-water emulsions.



When oil-loving and water-loving groups are fairly well balanced, HLB is intermediate (around 10).

tion. "Required HLB" values have been determined for a number of commonly used emulsion ingredients. Some typical values are listed in the table.

HLB values are additive. To obtain the "required HLB" of an emulsion, the HLB of each oil phase constituent is multiplied by its weight percentage in the oil phase. Total HLB is obtained by adding the numbers thus calculated.

Knowing the HLB required for the given emulsion, you can then make an initial selection of a surfactant or blend that will provide this HLB value. HLB is additive for surfactant blends, too. By multiplying the HLB of each surfactant by its weight percentage in the blend, the contribution of each to the total surfactant is obtained. The sum of these values represents the HLB of the combination of surfactants.

Chemical identity is important

In addition to having the correct HLB value, a surfactant must also have the proper chemical type for its intended use. This factor is determined empirically at present. Certain chemical types of surfactants are known to work most effectively in definite classes of emulsion applications.

Knowing the required HLB, it is generally advisable to try a variety of surfactants of different chemical types at the optimum HLB. By narrowing the choice to a given HLB range, this system focuses attention on a relatively small number of surfactants out of the thousands available.

A detailed procedure for using the HLB system, and specific recommendations for numerous formulas, are available from Atlas in the booklets titled "Industrial Emulsions with

"REQUIRED HLB" Values

	W/O Emul.	O/W	Solubil- izing (O/W)
Acid, stearic	—	17	—
Alcohol, cetyl	—	13	—
Lanolin, anhydrous	8	15	—
Oil			
Cottonseed	—	7.5	—
Essential	—	—	16.5
Mineral, heavy	4	10.5	—
Mineral, light	4	10-12	15.5
Vitamin (with fats or oils)	—	—	15
Vitamin (fat free)	—	—	16.5
Petrolatum	4	10.5	—
Vitamins			
Esters	—	—	14
Wax			
Beeswax	5	10-16	—
Microcrystalline	—	9.5	—
Paraffin (household)	4	9	—

Atlas Surfactants" and "A Guide to Cosmetic and Pharmaceutical Formulations." A copy of either or both

booklets will be sent to emulsion technologists who request it in writing on their company letterhead.



Atlas HLB Selector helps the emulsion formulator by providing a ready reference to recommendations on Atlas surfactants and HLB values for 96 typical emulsion formulas. We'll be glad to send a Selector with full directions to anyone concerned with the preparation of emulsions.

SPECIALTIES . . .



GUN BLUING: Hot-dipped in nitrates (left), or touched up cold, bluing demands over \$100,000 in specialties.

Firearms Specialties Join the Hunt

There's more in a hobby than diversion for an individual—just ask a chemical specialties maker. Now, for example, hunters and gun enthusiasts over a large portion of the country are rejoicing because it's deer and duck season—and every firearm that's unlimbered for the hunt is one more device demanding such specialties as compounded solvents and rust preventives, lubes and greases.

Just how big are the requirements for such products is difficult to pinpoint, but an easy 15 million hunting licenses will be issued this year. Many of these hunters have more than one weapon—it's estimated that the average gun hobbyist has at least three—and that makes for a pretty substantial market.

Handle with Care: Basically, this market is divided into two areas: the cleaning and gun care items that every gun-respecting shooter uses, and the products such as gun blues, stock stains, that the gun hobbyist needs.

Best known name in firearm cleaning compounds is that of Frank A. Hoppe, Inc. (Philadelphia). In the past 51 years, by offering just four special-

ties (gun cleaning patches, No. 9 powder solvent, lubricating oil, gun grease), it has become a \$100,000 firm steadily employing about 20.

Major item in the Hoppe line, and long the dominant product in the field, is No. 9 Nitro Powder Solvent. Designed to remove primer and powder residues, and to loosen metal fouling (lead or jacketing metal that scrapes off the bullet when it's fired), it also has acid neutralizing and rust-inhibiting qualities.

It hasn't the whole field to itself, by any means. One of the newest competitive products is Armsol, made by J. A. Gaines Co. (Ammiston, Ala.), introduced about three years ago. There are plenty of others—Casey Chemical Co.'s (Minneapolis) Sheath; Marble Arms and Mfg. Co.'s (Gladstone, Mich.) Nitro Solvent Oil; Rustprufe Laboratories' (Sparta, Wis.) NitroSolvent and Rust Proofing Oil.

Lube Specials: For the cleaned parts, and for the precision-made moving mechanisms of firearms, a number of thin, penetrating, rust-inhibiting oils have been marketed. Again, Hoppe's

Lubricating oil is generally accorded the top position in the market (2 oz. sell for about 50¢). Nyeoil, produced by William F. Nye Co. (New Bedford, Mass.) is reported by many gun shops as the No. 2 seller.

Some of the major sports gun manufacturers sell their own brands of gun oils—Winchester and Remington are typical. The Winchester oil is now aerosol-packed (4 oz., about \$1.39).

A brand-new product is Harlan Industries' (Chicago) Restoroil, a silicone-based oil. It will face plenty of competition from Clenzoil (E. C. Lenz Co., Canton, O.); Fiendol (McCambridge and McCambridge, Riverdale, Md.); Fulcrum Reel & Gun Oil (Fulcrum Oil Co., Franklin, Pa.); Gun Guard (Mitchell Chemical Co., Stratford, Conn.) and Ti Kit Rust Preventive (Bekol Chemicals, Inc. Houston), to name a few.

Silicones and VPI (vapor phase inhibitor) rust preventives have been warmly greeted by gun enthusiasts. A big seller in most stores is Silicote, a gun and tool cloth impregnated with silicone. It's made by Silicote Corp.

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Molecular Weight of Active Ing.	380	380	380	292
100 Parts of Nullapon Controls	6.7 parts CaCO_3	10.0 parts CaCO_3	20.0 parts CaCO_3	33.5 parts CaCO_3 when used in alkaline solutions
Or... 1 oz. by weight in ten gallons of water controls	49 PPM CaCO_3	73 PPM CaCO_3	146 PPM CaCO_3	245 PPM CaCO_3 when used in alkaline solutions
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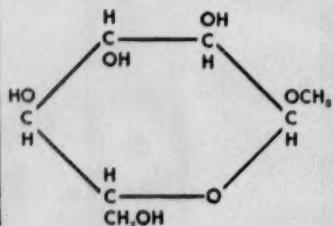
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Methyl Glucoside contributes faster drying . . . improved adhesion . . . increased hardness . . . and improved water resistance to drying oils, varnishes, and tall oil esters.

Now available in commercial quantities. Write today for samples and technical literature.

"Fine Chemicals from Corn"



**CORN PRODUCTS
REFINING COMPANY**

137 BATTERY PLACE • NEW YORK 4 N.Y.

SPECIALTIES

(Oshkosh, Wis.), sells for about \$1.50.

Castle Sporting Goods, Inc. (Yonkers, N.Y.) sells its VPI Ruscoban in a 2-oz. polyethylene container (75¢) for treating gun cases, and Berlin & Jones, Co. makes a paper "gun boot" treated with VPI. Browning Arms Corp. (St. Louis) will soon market a VPI compound for gun care.

Greases, for coating arms that are to be stored for some time, are fairly common. Hoppe's Gun Grease, tube packaged, 2½-oz., 45-50¢ is typical. Other major sellers are Rig Products Co.'s (Oregon, Ill.) Rig, Silicote's Gun Lube, and Stoeger's Gun Grease.

Do It Yourself: Although nearly everyone who owns a gun feels compelled to buy cleaning materials, not all go in for jobs like rebluing barrels, refinishing gunstocks, and the like.

Nevertheless, there is a good market for some of these products.

It is estimated, for example, that at least 100,000 2-oz. containers of touch-up gun blues sell every year, mostly at about \$1/unit. In addition, there's a considerable market for them in bulk—equal, in volume, if not in retail value, to the individually packed materials.

Some of the gun shops market their own blues; about the best known names in bluing compounds are Birchwood Chemical Co. (Minneapolis) with its Magic Bluer (Birchwood also sells compounds for darkening other metals); Casey Chemical Products' (Minneapolis) Perma Blue; Fur Fame Bait Co.'s (Fremont, O.) Nimrod Gun Blue; Herter's (Waseca, Minn.) Belgian Gun Blue; Liberty Supply Co.'s

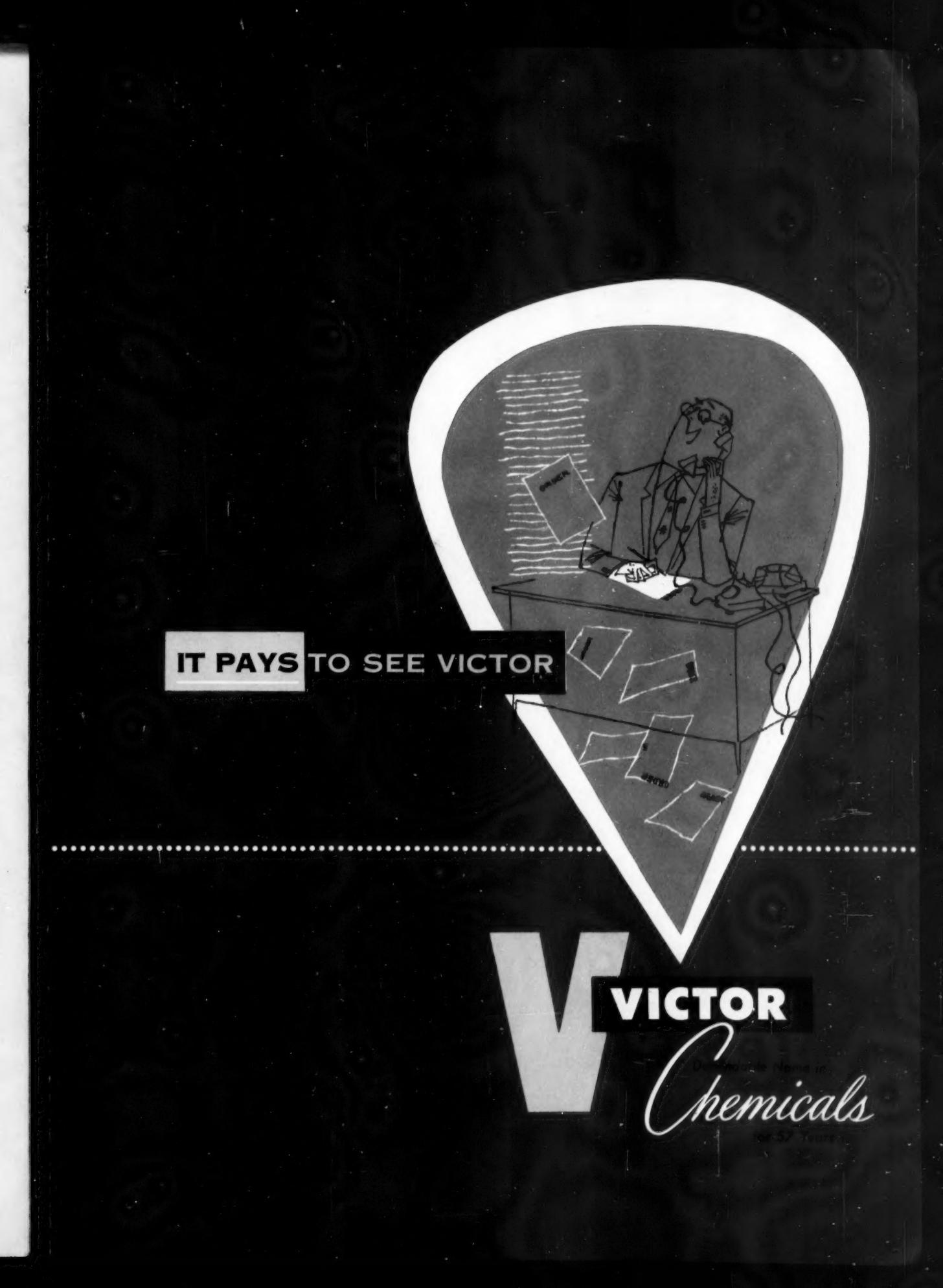


Strippable Poster-Paint

A PRODUCT with more than a Christmas season potential is A-Peeling Paint. A poster-paint that won't run when wet, that peels off without leaving a residue, it is manufactured by Pacific Compounding & Packaging Co. (Redwood City, Calif.) Two formulations are offered—one for industrial use, the other for home use (this

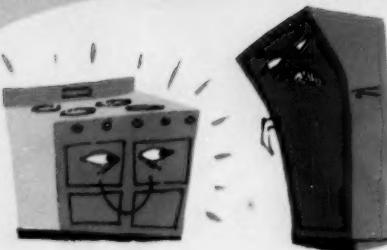
dries quicker, has less adhesive). Both types are based on Bakelite vinyl resins, come in a variety of colors, adhere to metal or glass. A holiday kit that sells for \$1.49 includes three colors—red, white and green—plus a brush and four patterns.

Sole distributor is A-Peeling Paint Co. (Palo Alto, Calif.).



IT PAYS TO SEE VICTOR

V VICTOR
Chemicals
Dedicated Name in
52



IT ALL DEPENDS ON THE "FRITS"

The beautiful, gleaming white porcelain enamel finish on modern appliances is made from "frits". These frits are melted at terrific heat and fused onto the steel shell of appliances to form an enamel coating. To control the physical properties of frits, vitreous enamel manufacturers use Victor monocalcium phosphate. This phosphate lowers the melting point of the frits, and improves the gloss. Here's another case where *it pays* to see Victor.

MONOCALCIUM PHOSPHATE, HYDRATED—Typical Uses: Manufacture of baking powder, phosphated plain flour, frits for vitreous enamel. Used as a bread improver, "rope" preventive, and in the manufacture of cookies and crackers.



OPERATION CHOPPER-MOPPER

Clear, tough methyl methacrylate is a versatile plastic which goes into everything from "chopper-moppers" (toothbrushes to 'teenagers) to canopies for jet planes. To make methyl methacrylate, manufacturers use phosphoric anhydride (P_2O_5), as a plasticizer, in the process. This use of P_2O_5 is just one of many applications for Victor products in the growing plastics industry... another industry which has learned that *it pays* to see Victor.

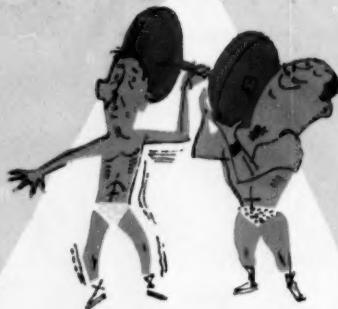
PHOSPHORIC ANHYDRIDE—Typical uses: Drying agent, condensing agent. Manufacture of resins, organic phosphates, and catalytic asphalt.



MUD WITH A MISSION

Custom-made mud for oil well drilling is almost worth its weight in gold. The special mission of this mud is to wash the well clear of cuttings and return them to the top. Mud builds a protective wall against the side of the hole to guard against cave-ins and to hold back gas pressures. To control mud viscosity, Victor sodium phosphates are added. The oil industry is still another field where producers find *it pays* to see Victor.

SODIUM ACID PYROPHOSPHATE—Typical Uses: Baking acid for doughnut flours and prepared mixes. Manufacture of commercial baking powders, and baking creams. Conditioning oil well drilling muds. Acid-type metal cleaner.



RELIEF FOR TENSION

Reducing surface tension of water increases its ability to penetrate, spread, or "soak". In metal cleaning, for example, the use of one of Victor's wetting agents in the cleaning solution assures a more rapid, more thorough coverage of the surface to be cleaned. Faster and better cleaning is the result. Many industries such as the textile, paper, detergent, laundry and chemical have found profitable uses for Victor wetting agents. *It pays* to see Victor.

SURFACE-ACTIVE PHOSPHORUS COMPOUNDS (Victawet® 35B, 58B, 12, and Victamine C and DI)—Typical Uses: Reducing surface tension; penetrant, dye carrier. Available in anionic, cationic, and non-ionic forms.



"SWELL" WAY TO PREVENT A BURN

Ammonium phosphates are among the most effective flameproofing agents known, and when one of these chemicals is combined with the proper resin as a coating for wallboard, the finished surface becomes intumescence. Treated surfaces of wallboard exposed to fire will only char and swell. This swelling or puffing, called intumescence, keeps the interior of the board at a temperature below the point of ignition. What's more, wallboard so treated will not support combustion. If you make, or process a product that can benefit from being flameproofed, you'll find *it pays* to see Victor.

FLAMEPROOFING COMPOUNDS (Ammonium phosphates, Fyrex® compounds)—**Uses:** Flameproofing of textiles, paper, wood, and vegetable fibers. Intumescence coatings.



A PINCH OF "SALT"

Wet-process cement manufacturers have learned that Victor sodium tripolyphosphate increases production. A pinch (less than 1/10 of 1%) of "tripoly" helps water carry far more raw cement particles and slurries are still pumpable. This enables cement makers to increase production around 10%, without adding new equipment. Let us tell you about all the other remarkable properties of "tripoly". Perhaps we can help you uncover a similar benefit. You'll always find *it pays* to see Victor.

SODIUM TRIPOLYPHOSPHATE—**Typical Uses:** Soap builder, manufacturer of synthetic detergents. Water softener, purification of china clay, deflocculant in raw cement slurries, conditioning of oil drilling muds, anti-pitch agent in paper making.

If **METAL TREATING** is your special interest

please turn to the next page

plants and offices of **VICTOR CHEMICAL WORKS**



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Dependable Name in
Chemicals
for 57 Years

VICTOR CHEMICAL WORKS

155 N. Wacker Drive, Chicago 6, Illinois

VICTOR

proves its mettle
(metal treating, that is)

From start-to-finish, Victor chemicals have proved their worth in the metal-working industry. Solutions containing Victor phosphoric acid, for example, are preferred for phosphatizing and rust-proofing steel prior to painting.

Now, metal finishers find even greater use for phosphoric in the field of chemical polishing. Chemical or electro-polishing baths containing phosphoric acid are fast replacing costly mechanical buffing for "stainless", aluminum, copper, brass, and other metals. Intricate metal shapes, formerly considered "unbuffable", are now given a bright, attractive finish (inside and out) . . . quickly, and at low cost. Here's another example of why industry finds *it pays* to see Victor.

VICTOR SERVES THE METAL INDUSTRY

CARBAMIDE PHOSPHORIC ACID—Temporary rust preventive, acid cleaner for metal . . . MONOAMMONIUM PHOSPHATE—Acid cleaner for metal . . . OXALIC ACID—brass polish . . . PHOSPHORIC ACID—Metal cleaning compounds, rust-proofing, railroad car cleaning, electropolishing, bright dipping aluminum . . . SODIUM ACID PYROPHOSPHATE—Contact tinning . . . SODIUM TRIPOLYPHOSPHATE—Cleaning compounds . . . TETRASODIUM PYROPHOSPHATE—Tin plating, cleaning compounds . . . TRISODIUM PHOSPHATE—Cleaning compounds, degreasing.

AMMONIUM PHOSPHATES
FOR PROTECTIVE COATINGS

OXALIC ACID FOR
CLEANING PAINTED SURFACES

PHOSPHORIC ACID FOR
CHEMICAL POLISHING

POTASSIUM PHOSPHATES
FOR ELECTROPLATING

TRISODIUM PHOSPHATE
FOR METAL CLEANERS

PHOSPHORIC ACID
FOR RUST PREVENTION



SPECIALTIES . . .

(St. Louis) Tru Blu; New Method Mfg. Co.'s (Bradford, Pa.) Minute Man and New Method blues; Numrich Arms Co.'s (West Hurley, N.Y.) Formula 44-40; Stoeger's S-75 and Old Connecticut Blues, and C. S. Van Gordon & Sons' (Eau Clair, Wis.) Van's Instant Gun Blue.

A typical formulation of modern blues is New Method's Minute Man Blue (U.S. Pat. 2,527,232). In this, a vehicle of about 94% distilled water is compounded with sulfuric acid (approximately 1-4%), copper chloride (about 1%), selenious acid (1%) along with a wetting agent.

Sportsmen use these blues to touch up their arms, manufacturers to refinish scratches, and office machine makers to coat machine parts.

For the gun enthusiast who wants to do more than touch-up work, "hot" bluing, (see cut) with near-boiling solutions of sodium and potassium nitrates, sodium cyanide, or some home-devised formula are used. Gun shops, like Griffin & Howe (New York) use these hot blues more than do amateurs; selling the chemicals are Lynx Line Products Co. (Detroit), Sears, Roebuck, and Stoeger, to name a few.

Stock Treatment: Although the war introduced guns to many men, and there was considerable postwar conversion of military arms into sporting arms, there has never been giant sales of specialties like stock stains and varnishes. One estimate: 10-15 thousand bottles/year.

Typical of the stock refinishing products on the market are Blevins Gun Shop's (Fresno, Calif.) Sun Ray finish (4-oz., \$1.25), George Bros. (Great Barrington, Mass.) Lin-Speed, Liberty Supply Co.'s (St. Louis) refinishing kits (\$1.10) and Birchwood's walnut stock stains.

Kits of touch-up blues, gun cleaners, and stain are widely sold—many gun shops urge new gun buyers to take a kit with every gun. One alert sports dealer says its chemical specialties sales—carefully promoted—make up about 10% of its retail volume.

Hard core of buyers of gun specialties, are, of course, the competitive shooters—the nearly 300,000 sportsmen who compete in shooting matches. Firms like Hoppe cooperate fully at such contests as a part of their promotion program.

But growing in numbers far faster than the match shooters are the hunters. Licensed hunters have increased from 6 million in '41 to 12 million in '47, 15 million now; and since '39, output of small arms and ammunition has more than doubled. All of this means a constantly expanding market for gun specialties.



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An industrial laboratory is a vital and complex tool — a modern, specialized facility that must be pre-planned and designed to obtain maximum efficiency and produce successful results.

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HICKORY'S HENDRIX: His Pro-nyl should cheer housewives.

Laundry Aid—Nylon Inspired

A nylon whitener combined with a powdered detergent—that's the newest product of Hickory Specialties Co. (Hickory, N.C.). The company modestly calls it "the happiest miracle since nylon itself."

Inventor Palmer Hendrix, Hickory's general manager, says previous attempts to unite a whitener-brightener with a detergent so that nylon could be bleached and washed in a single operation have failed—for a good reason: when a detergent was combined with a bleaching agent, it caused a chemical reaction that destroyed the agent's affinity for nylon. He says he has licked this.

Specific claims Hickory makes for the powder:

- Restores original whiteness to white nylon fabrics.
- Brings back original brightness to colored nylons.
- Stops annoying "nylon-cling" by means of an antistatic ingredient.

Liquid, Too: This is not to say that the company is opposed to nylon whiteners in liquid form. Before coming up with the powder, Hickory was selling just such a product and continues to sell it. It's used in the final rinse bath. Both it and the new product are dubbed Pro-nyl.*

While Hickory won't reveal the formula for the powder, a U.S. patent (No. 2,692,238) granted last month states that liquid Pro-nyl is based on

*Pro-nyl Chemicals, Inc. is the distributor. It was set up only two months ago by Hickory.

an amino cumarin and monohydric alcohol. In addition, the liquid is covered by U.S. Pat. 2,619,470 and Canadian Pat. 500,373. Patents are pending on dry Pro-nyl.

Directions for use of the powder call for one tablespoonful to one gallon of hot water in hand laundering. In machine laundering, four tablespoonfuls are required. Powder prices: 54¢ for an 8-oz. container, 84¢ for 16-oz. (The liquid costs are nearly similar.)

Real Need: While Hickory says powdered Pro-nyl is unique, other detergents on the market are also known to contain nylon brighteners. Still, Hickory has a strong selling point in offering a remedy for the yellowing tendency of nylon fabrics.

A specialties firm with sales around \$500,000, Hickory also makes synthetic resins, cationic softeners for textiles. Pro-nyl is its first consumer product, and the company plans more.

Memphis Survey

A consumer panel study on the family buying habits in Memphis, Tenn., has just been released by the Memphis Publishing Co.

Here's the status of chemical specialties sold in Memphis grocery stores during the first six months of this year, according to the survey:

- Liquid bleaches: Clorox, 54.6%; Purex, 36.3% (buyer preferences).
- Scouring powders: Ajax, 66.9%; Old Dutch, 11.8%; Bab-O, 16.2%.

- Laundry bar soaps: Ivory, 49.4%; Octogon, 21.7%; P&G, 19.8%; Swan, 4.0%.

- Packaged soaps and detergents: Tide, 33.4%; Duz, 9.5%; Fab, 9.5%; Cheer, 12.4%; Rinso, 6.9%; Oxydol, 5.6%; All, 3.3%.

- Toilet bar soaps: Ivory, 22.1%; Palmolive, 12.8%; Lux, 15.4%; Camay, 11.3%; Dial, 9.5%; Lifebuoy, 9.0%.

In the household wax and polish field, Johnson was clearly the leader. These are the percentage totals for five out of six categories along with the top sellers:

- Paste, 17.7%: Johnson, 13.0% (this is percentage of all categories).

- Liquid, 17.7%: Johnson, 7.2%; Simoniz, 2.6%.

- Nonrubbing, 38.6%: Johnson, 19.8%; Aerowax, 13.0%.

- Floor cleaners, 11.1%: Johnson, 6.3%; Bruce, 2.6%.

- Furniture polish, 10.1%: Johnson, 5.6%.

In auto waxes and polishes, Simoniz Auto Wax took 28.9% of the sales: Johnson Auto Wax, 15.6%; Johnson Car-Nu, 13.3%; Johnson Car Plate, 8.9%; Du Pont Auto Brite, 4.4%.

Detergent Debut

Kicked off with full-page color advertisements in Chicago last fortnight was the new liquid detergent, Winko, sold by Linco Products Corp. For its introductory campaign, Linco is selling a twin-bottle package—regular size plus a 4-oz. sample bottle "free."

The regular size of Winko is somewhat uncommon: selling for 39¢, the price of competitive 12-oz. sizes, it contains 14.4 ounces. One bottle is claimed to wash 2500 dishes.

Winko is still strictly a test-market item, and since Linco products are best-known in the Midwest, the new syndet may never be nationally distributed. But liquid detergents have continued to show amazing growth, and their popularity seems undimmed. In the past few months, there have been major changes in the sales positions of the big names in dishwashing compounds, and Linco's move indicates it feels the market isn't firmly settled in favor of any one brand.

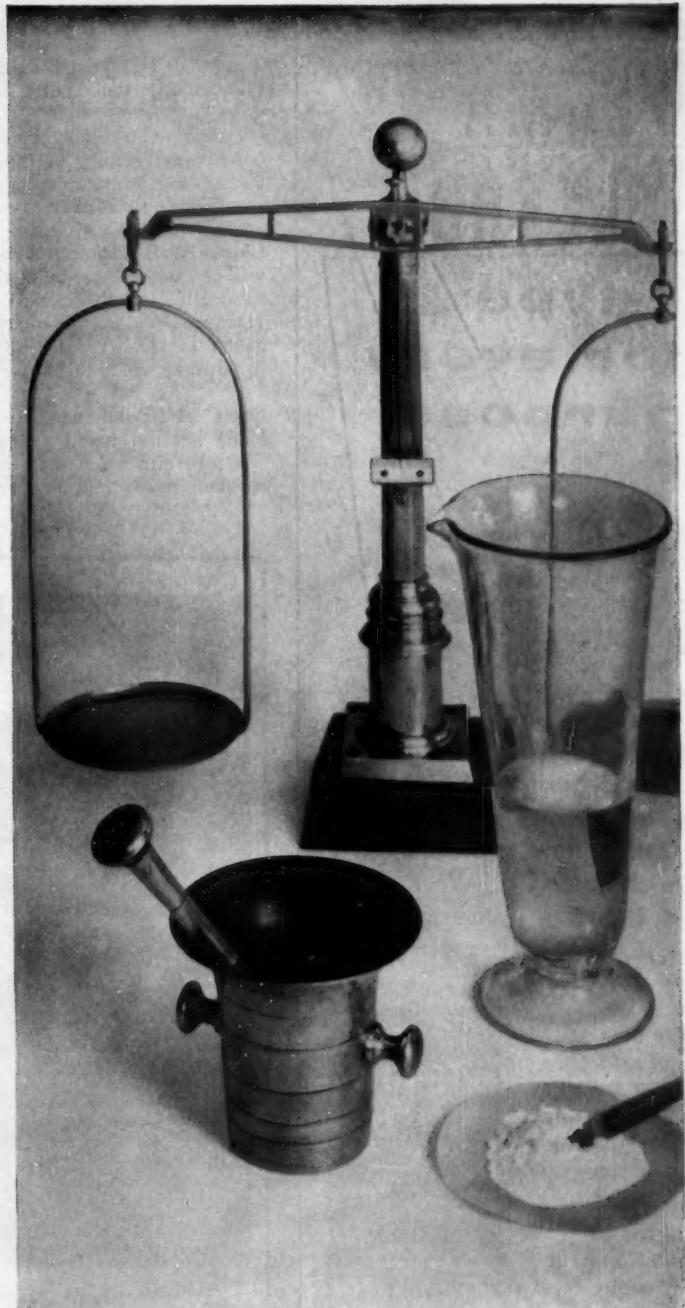
- **Longer Storage Life:** Arnold, Hoffman & Co., Inc. (Providence, R.I.) now markets an improved Ahcovat Soluble Green IB paste. The dyestuff is reported to have greater stability, longer storage life than the previous type.

- **Lighter Lubricant:** A lubricant for light- or pastel-colored rubber stock is

Eastman raw materials for the pharmaceutical industry

For information about these and other Eastman industrial chemicals, call our nearest sales representative or write to Eastman Chemical Products, Inc., Chemicals Division, Kingsport, Tennessee.

	SOLVENT	INTERMEDIATE	ACETALATING AGENT	STABILIZER	MISCELLANEOUS
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acetic anhydride					dehydrating agent
acetaldehyde					
acetanilide					
acetone					
ethyl acetate					
isobutyl acetate					
isobutyl alcohol					
isobutyraldehyde					
isopropyl acetate					
hydroquinone dimethyl ether					ultraviolet inhibitor
oxidized cellulose					hemostatic agent and adsorbant



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SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; New York—260 Madison Ave.; Framingham, Mass.—65 Concord St.; Cincinnati—Carew Tower; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave.; St. Louis—Continental Bldg.; Houston—412 Main St. West Coast: Wilson Meyer Co., San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Seattle—821 Second Ave.

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development
of sequestering agents, we
suggest you send for our
latest revised booklet
explaining testing methods
and comparisons, pages 30-31-32
Make your own tests!



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PRODUCTS
CORPORATION
Manufacturing Chemists
630 Schuyler Avenue
Lyndhurst • New Jersey

SPECIALTIES

being sold by The Du Bois Co., Inc. (Cincinnati), maker of cleaning and processing compounds. Liquid-Lube NT does not stain light colors, does not become gummy or resinous as a final dress coating, does not oxidize on standing, the company says.

Liquid Wall Cleaner: A new liquid wall cleaner, Race, is being distributed nationally by the Keen Company (Danville, Va.). One quart makes a gallon of cleaner for painted walls, woodwork, windows, mirrors.

One-Coat Black: Speco, Inc. (Cleveland) has developed a new type of Chem-Rem, a black, acid- and alkali-resistant paint, said to have greater

covering capacity than its predecessor. One coat is claimed to do a job equal to several coats of old-type Chem-Rem formulation.

Sticker: Paisley Products, Inc. (New York) has a product—Insulam—claimed to stick glass fiber insulation pads and blankets to sheet metal, aluminum foils, fabrics, wallboard, etc. It's a self-extinguishing, fire-resistant synthetic resin emulsion with quick wet-tack and suction to hold assemblies together until dry.

For Fingertips: A new preparation called Sortwik, made by Lee Products Co. (Minneapolis), is applied to fingertips to give a tacky film that's



STANFORD RESEARCH INST.

Check on Bond Security

DETERMINING the effectiveness of organically bonded metal laminates has been simplified by use of an invention by Stanford Research Institute. An electronic device, it can do many jobs that could formerly be done only by destructive testing of the bonded part.

The instrument, called the Stub Meter (from Stanford Ultrasonic Bond meter), consists of a probe, which contains an ultrasonically

vibrated ceramic plate (barium titanate), and an oscilloscope, which shows variations in the vibrations of the plate.

When the Stub Meter probe is moved over glued areas (see cut), the rigidity of the area directly under the probe affects the ceramic's vibration response, which is registered on the oscilloscope. High "pips" on the oscilloscope indicate where the bond is poor.

THIS IS MERCHANTS



This is Wallace P. Mann, District Manager of our Omaha office. He joined us in March, 1945, after serving with Wyandotte Chemicals Corporation since 1933. With a background of 34 years in the chemical business, Mr. Mann is well qualified to help solve your chemical problems. He is particularly experienced in selling chemicals to the mineral feed industry, and now serves as a Director of the National Mineral Feed Association, Inc.

Under Mr. Mann we have four salesmen covering Nebraska, Iowa, Northeastern Kansas, and Southeastern South Dakota. In our Omaha warehouse we carry a full line of industrial chemicals, feed chemicals, laundry and dry cleaning supplies and dry ice, and they are ready to make prompt delivery to our customers in the area.

Sales Offices and Warehouses: Chicago, Cincinnati, Denver, Louisville, Milwaukee, Minneapolis, New York, Omaha
Stock Points: Albuquerque, Aurora, Ill., Erwin, Tenn., S. Norwalk, Conn.

ACIDS • ALKALIS • FUNGICIDES • SURFACTANTS
CHLORINATED SOLVENTS • LAUNDRY COMPOUNDS
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Distributors of industrial chemicals for over a quarter century.



For those

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1989

These stock points are just right
when you want them

TRICHLORETHYRENE
SODIUM BICARBONATE

USP & Technical

Sodium Cyanide

Potassium Cyanide

Copper Cyanide

Sodium Aluminate Dry

Potassium Nitrate

Sodium Perborate

"Alleprene"
(Chlorinated Rubber)

Calcium Formate

LCL

This is only a partial list.

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INCORPORATED

NEW YORK 32, N. Y.
444 MADISON AVENUE

Supplying

SPECIALTIES . . .

claimed to make paper sorting easy. Greaseless, stainless, easily washed off, the product comes in a plastic container, sells for 50¢.

Color Concentrates: Claremont Pigment Dispersion Corp. (Brooklyn) has brought out a 4000 Series of color paste concentrates designed specifically for coloring epoxy, thiokol and polyurethane resin systems.

Aviation Sealant: A new aviation and industrial chemical sealant, No. 1372, is being made by Permatex Co. Inc. (Brooklyn). It's said to form a pressure-tight, leakproof seal at temperatures as high as 650 F.

Making Wallpaper Washable: Resistane Co. (Madeira, O.) offers a new stain-resistant, water-repellent plastic coating that's said to permit repeated soap-and-cold-water washing of wallpaper. It may be applied either before or after hanging. Price: \$1.50/pt.

Cotton's Moniker: The name Azotan has been chosen for fibers produced by cyanoethylation, the reaction of ordinary cotton with acrylonitrile.

Specialties Recipes: "Chemical Products and Processes," a book that contains 1350 government-owned inventions in the chemical field, has just been published jointly by the U.S. Dept. of Commerce and the Small Business Administration. Aim: to stimulate greater utilization of these inventions. The 19 broad classifications include fertilizers; cleaning and polish preparations; glue, gelatin and adhesives; paints, varnishes, inks and pigments; insecticides, fungicides and rodenticides. The 101-page book (Order No. PB 111465) is available at \$3/copy from the Office of Technical Services (Room 6227), U.S. Dept. of Commerce, Washington 25, D.C.

Odor Ousters: A new group of aromatic masks and perfumes has been developed by Standard Aromatics, Inc. (New York) to overcome objectionable product odors. The series, called the Maskaromes, ranges in price from 33¢ to 75¢/lb.

Change: Du Pont has adopted Valron as its trademark for the estersil formerly known as Du Pont Fine Silica.

Novel Aerosol: Now obtainable is an aerosol designed to prevent water damage from sprinklers by warning of fire before they turn on. Method: when the temperature reaches 135 F. a fusible link opens, sets off a 5-minute wail

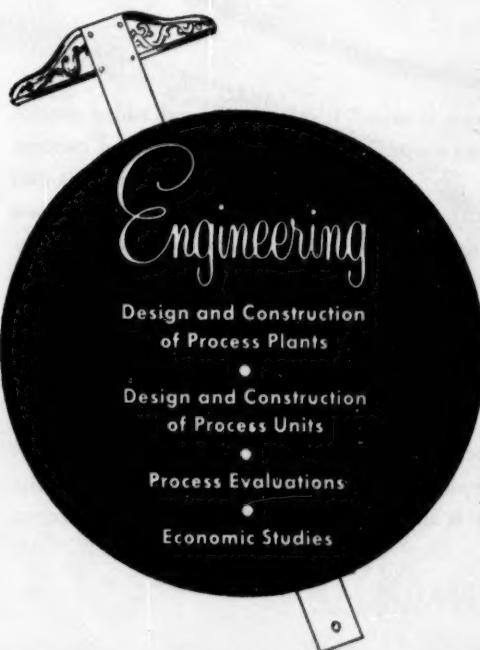


ECONOMIC STUDIES *For Process Evaluation*

"Are we sure we're on the right track—process wise?" . . . a question every company asks itself when planning a new plant or unit.

Usually there are available more than one process for coming up with the desired end-product with or without certain desired by-products. The problem then is to decide which method is best when all factors are considered.

We offer our services in connection with such evaluation, bringing to the problem a very broad experience in many fields of processing such as:



Organic Chemical Synthesis
Inorganic Chemical Processing
Catalytic Operations
Solvent Purification
Separation and Refining of Organic Chemical Mixtures
by conventional, azeotropic and extractive
distillation, liquid-liquid extraction, crystallization

Petroleum Processing:
Topping and Vacuum Distillation
Lube Oil Units
Coal Tar Distillation
Gas and Vapor Recovery
Pharmaceuticals

Should you contemplate employing outside services for a study of all factors leading to a sound process evaluation, we'll be glad to discuss how we might be of help to you.

BADGER MANUFACTURING COMPANY

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how to leap-frog your way

They fly mighty high! Economists get dizzy trying to catch up with the Chemical Process Industries. New products! More volume! New markets! Expansion and change! But what a king-size opportunity it builds up for the seller.

Your competition's jumping! Literally swarming all over the field as CPI operators stretch for an eye-popping \$70 billion-a-year output by 1960. Chemicals, conveyors, containers! Motors, mixers, instruments! Makers of equipment, raw materials producers, servicers! They're bustin' their brief cases to give the chemical engineer extra attention here in industry's fastest-moving market.

CE's helping. Buyer and seller both got a boost last month when **CHEMICAL ENGINEERING** launched its *Annual Inventory Issue*. This brand-new bench mark for CPI publishers was a smash-hit first trip out. Timely, unduplicated, wholly practical . . . it's a 12-months sourcebook of salient process developments, cut to the reader's own specifications. And it's got all the makin's . . . as a customer-stopping supermarket that'll push your product in his plant all year round.

How can it miss? It's a logical added service, so long-wanted, natural in format and content.

And CE's editors make it easy

. . . reading matter easy to scan, easy to digest . . . ads easy to spot, a cinch to follow up for more information.

Bingo! Right at your fingertips is the permanent showroom for your full line every heads-up CPI advertiser has been looking for.

Did we say leap-frog? We meant it! It'll add impetus to your selling that'll keep those CPI orders hopping.

But don't wait'll next September . . .

Put the *Inventory Issue* on your CE schedule right now!

Nothing like making sure of that extra surge of high-readership, low-cost advertising. You can't buy it anywhere . . . but **CHEMICAL ENGINEERING**.



CHEMICAL PROCESS INDUSTRIES

to new CPI business

can you use these CPI selling tools?

CONSULTING ENGINEERS is just off the press with a close-up of these important CPI buying influences. 16 page booklet details areas of operation, volume, purchasing power . . . based on a comprehensive survey among top-flight engineering firms.

HOW TO BEEF UP RAW MATERIALS SALES is another 16-pager built around a 1954 study of chemicals salesmen. Covers market size—selling methods—what the chemical engineer buys—how to appeal to him in your ads.

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SPECIALTIES . . .

plus a telltale odor for those who can't hear. Name: Fire Sentry. Maker: Richard Stuart Mfg. Co. (Philadelphia).

Three: Atlas Mineral Products Co. (Merztown, Pa.) has introduced these products:

- Urefoam, a polyurethane product intended for foamed-in-place use.

- Alfane, an on-the-job mixed epoxy-based cement, employed to join foamed glass, brick, tile, carbon.

- Coatings based on Neoprene, and applicable to metal or concrete surfaces. They come in gray or black.

Pill Progress: Tablets that won't transfer color to moist hands is the latest news from Arner Co., Inc. (Buffalo). The secret is a coating of edible resins that "fixes" the colors. The coating is applicable to all sugar-coated tablets.

Ladies Only: McGuire & Co. (Oakland Calif.) has begun selling an aerosol shave cream designed for feminine use. The color is pink, and the name is Pink. Price: \$1.50.

Expansion:

- Lakeside Laboratories, Inc. (Milwaukee) has completed a plant that will add 23,500 sq. ft. of space.

- The Cooperative Grange League Federation will erect an \$800,000 fertilizer plant at Big Flats, N.Y. The organization also has opened mixed fertilizer plants at Albany, N.Y., Bridgehampton, N.Y., and Union City, Pa.

- Hughes-Johnson Chemical Co. (Portland, Ore.) has leased tidewater property at Portland for a plant to manufacture superphosphate fertilizers.

Doing It with Dust: Lederle Labs says chickens may now be immunized against Newcastle disease with an ordinary dust pump and a new vaccine the company has developed. The vaccine, which comes in dust form, is merely emptied into an inexpensive pump or gun, enabling one man to immunize up to 5000 birds in a single hour. The company explains that it had previously developed an injected vaccine but for a long time had sought a simpler and speedier method of application.

Another Fish Killer: Packard, Van Riper Corp. (Jersey City, N.J.) reports that Agava, which is derived from the agave plant, may be employed to eliminate unwanted fish. The company bases its claim on the ability of the product to absorb oxygen from water and thereby suffocate the fish.



Dependable Source for Chemical Raw Materials



E. F. Schulte, president, Etsol Synthetic Products, suppliers of metal-cleaning compounds for industry, believes Wyandotte Pluronics to be among the finest wetting agents they have used to date.

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This progressive company has met the challenge for better cleaning at lower total cost by using the newest, most efficient ingredients on the market in its products. Among these new ingredients are the Pluronics*, Wyandotte's new series of nonionic surfactants. Edwin F. Schulte, president of Etsol Synthetic Products, says of Pluronics: "We have used many products as wetting agents. In our experience, the Pluronics are better than any of the others we have tried. It is amazing how much we accomplish with such a small amount of Pluronics. In our metal-

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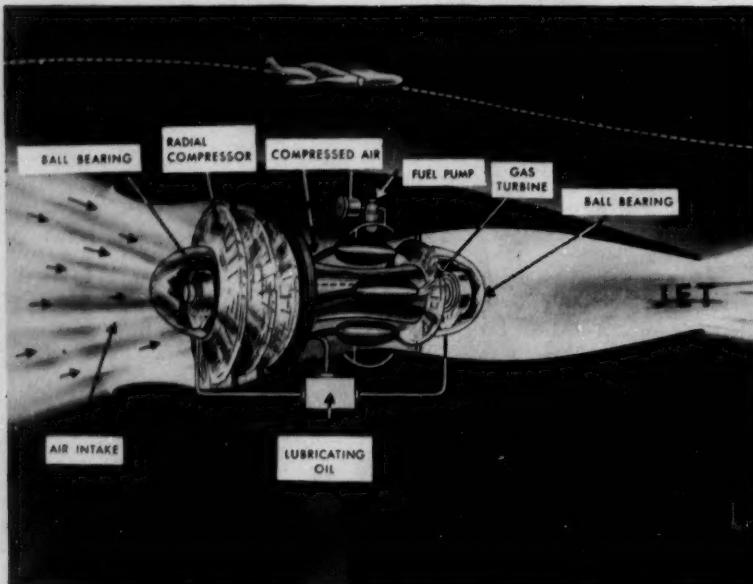
and different properties have already established them in water conditioning, in dishwashing, in laundry compounds, in soaps, as well as in metal-cleaning and -cutting compounds. Write for further data and samples. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

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RESEARCH . . .



HEART of the problem, the jet engine's lubricating system calls for oils to operate at 450 F. Too hot for petroleum lubes, this kind of service is behind the . . .

Big Swing to Synthetics

For more than a year and a half now, Jersey Standard's diester oil has managed to maintain its lead position as the only synthetic lubricant approved for use in military jet aircraft engines. During that period, a hungry pack of aspiring competitors has formed in pursuit. Last week a band of newcomers joined the chase, while a familiar adversary appeared to be pulling abreast of the frontrunner. The former: a raft of phosphorus chemicals under scrutiny at Southwest Research Institute (San Antonio, Tex.). The latter: a finished lubricating composition developed by the Texas Co. (New York).

Although the exact chemical identities of Southwest's phosphorus compounds are a secret (pending release by the Air Force), it's known that they are derivatives of phosphoric acid. They could be phosphate esters—a class that has yielded many promising lubricants—but that's guesswork.

And, as far as the military is concerned, chemical structure is not the controlling factor. Synthetic lubricants are rated and purchased on the basis of performance alone. What is important is that Southwest researchers feel they have a number of materials that can withstand temperatures of 500 F and

above. That's good enough to pass Defense Dept.'s most critical temperature tests.

Detailed in Defense specification MIL-L-7808B, these tests effectively establish temperature limits of -65 F and 450 F. To get by, a lubricant must be stable and not excessively volatile at the upper extreme, remain fluid at the lower. In addition, it must pass muster on such added points as corrosiveness, flammability, wear prevention, hydrolytic stability, thermal oxidation stability, and tendency to swell rubber, gasket and hose materials.

Not Fatal: Cost, of course, is important, but it would not disqualify a candidate that showed well on all other counts.

Of the new phosphorus compounds, chemist Charles Raley, who plays a key role in Southwest's synthetic lube work, says: "They should be cheaper and better than synthetic lubricants now in use." That, of course, remains to be seen. Entering its third year, the Air Force-supported study has yielded a whole raft of potentially valuable chemicals.

"What needs to be done now," admits Raley, "is to sort out the best." If this screening effort does, indeed, yield compounds that fulfill Raley's

expectations, Southwest scientists will have due cause for self-satisfaction. Reason: thus far, organophosphorus materials have been something less than an unqualified success as likely jet lubes.

Most phosphorus compounds that have been evaluated for this purpose spring from a parallel search for non-flammable military (and industrial) hydraulic fluids. Like Monsanto's Skydrol and Pydraulhydraulic fluids, for example, many synthetic lube candidates are phosphate esters.

Up to about 300 F these materials function quite satisfactorily. Above this temperature, however, the phosphates' low flammability and excellent lubricity are offset by poor stability.

But there's no law that unalterably pins this failing on every one of the vast number of organophosphorus derivatives. Virginia-Carolina Chemical Co. (Richmond, Va.), for one, is hopeful that its comparatively new alkyl phosphites and alkyl phosphonates will prove out. They are now being evaluated as lubricants and lube anti-oxidants. Victor Chemical Works (Chicago), also prominent in phosphorus chemistry, has supplied (independently and on request) a number of compounds to various lubricant investigators. And Monsanto, of course, has lost none of its interest in furthering phosphorus chemicals.

No Imminent Threat: It's generally agreed, though, that phosphorus progeny constitute no immediate threat to the ester oils. Esso's product (developed by Standard Oil Development Co., a Jersey Standard research affiliate), containing di-iso-octyl sebacate and possibly an adipic ester, is still the only synthetic lubricant composition that has been approved for purchase by the armed forces under the crucial MIL-L-7808B specification.

But several other products have completed or are now taking a 100-hour jet engine test, the payoff of 7808B's evaluation regimen. Carried out at the Air Force's Wright Air Development Center (Dayton, O.), this 100-hour ordeal effectively separates the wheat from the chaff, even though candidates must meet stiff performance requirements to qualify for the test.

Ester-type lubricants of Rohm & Haas (Philadelphia) and The Texas Co. are reported to be completing engine tests. Texaco is highly optimistic about the outcome, appears to be anticipating momentary notice of approval. Exact identity of these materials and all others in the field are kept under proprietary secrecy, as far as

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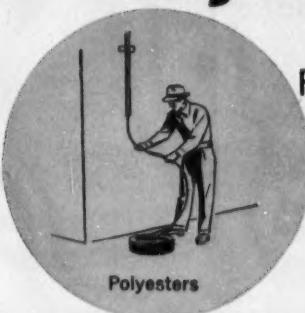
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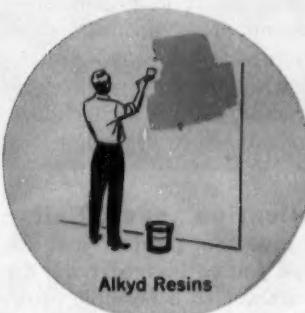
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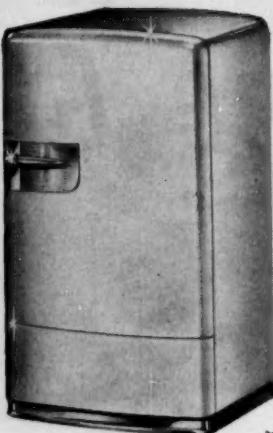
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RESEARCH

possible. And government security regulations operate strongly in this field.

Clues: But the trends in diester lubricant development are clear enough, provide clues to new compounds that are emerging.

Especially significant in this context is a studied effort to get around the sebacates. Easily the most important group of lubricant diesters, the sebacates dwell in the shadow of chronic supply woes. Made from castor oil, they are used as low-temperature vinyl plasticizers, have another big outlet shaping up in the production of extra-tough di-isocyanate rubbers. Supply-wise, moreover, the sebacates compete with a spate of other castor chemicals that find use as plasticizers, fungicides, etc. If demand were suddenly to skyrocket, as in a national emergency, there just wouldn't be enough to go around.

Consequently, researchers have turned to other dibasic acids in an effort to bypass this unstable setup. Petroleum-derived adipic acid was a natural first selection. Adipic esters have been found to be as good as sebacates at the low end of the scale, but tend to thin out excessively at high temperatures.

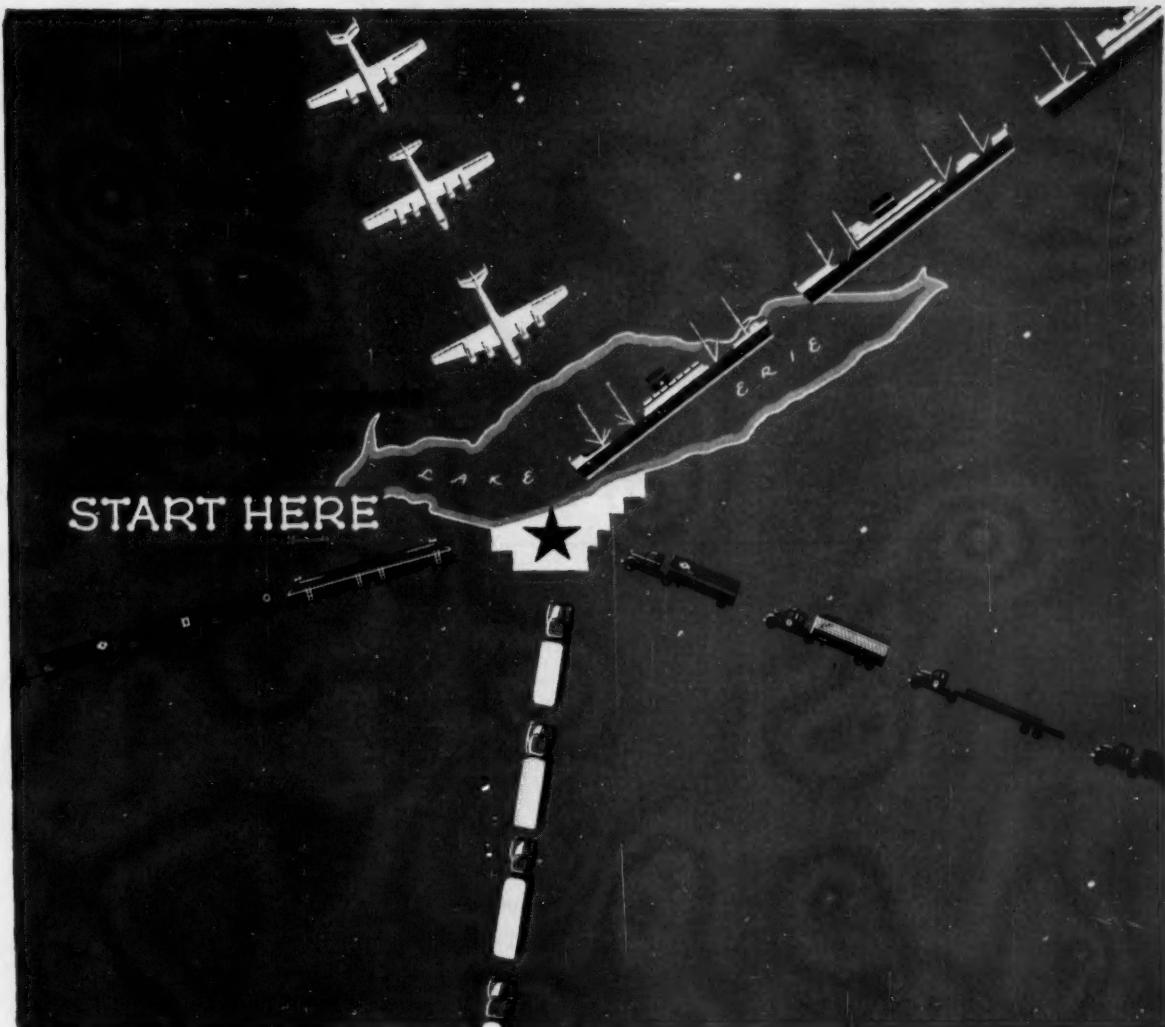
Chemists are now trying to determine if this drawback can be offset by new alcohols used in esterification. There's hope that a highly branched alcohol—one of the decyls, for instance—will do the trick.

Azelaic acid, a product of Emery Industries' new tallow-splitting (by ozone) process, is also being scrutinized. While azelate research is not very far along, it's believed that the properties of esters of this nine-carbon acid will closely resemble those of the sebacic (10 carbons) esters. Since even- and odd-number diacids often seem to be members of different homologous families, there's some justified skepticism on this score.

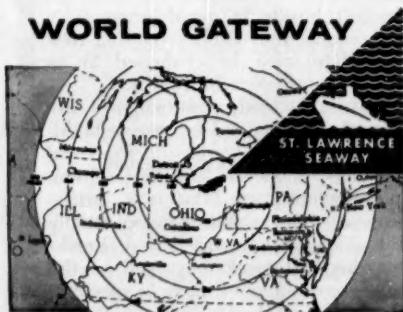
Add azelaic angle: esters of coproduct pelargonic acid might serve as anticorrosion additives, in synthetic as well as general lubricants. Protective Treatments (Dayton) has done much work with azelaic-based lubes.

Five in All: Aside from diesters and organophosphorus chemicals, three classes of compounds comprise virtually the entire synthetic lubricant spectrum. They are: silicones, silicate esters, polyglycol ethers. All have their strengths and weaknesses for aircraft turbine lubrication, and all are under active investigation in government and industry laboratories.

General Electric, an important manufacturer of jet engines, and Dow



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Five classes of chemicals comprise virtually the entire spectrum of synthetic lubricants. Here's how they stack up on the essentials required for performance in jet aircraft engines.

	Diesters	Phosphorus compounds	Silicones	Polyglycol ethers	Silicate esters
cost/gal.	\$5-10	\$4-12	\$30-40	\$2-6	\$10-12
oxidation stability 400-600 F	good	poor	good	fair	poor
lubricity	good	excell.	poor	good	fair
corrosion	good	fair	good	good	good
volatility	good	good	good	fair	good
viscosity-temperature characteristics	good	fair	excell.	good	excell.

Source: The Texas Co., Esso Standard Oil Co.

Corning are the most active probers of the silicone producers (others: Linde, and Plaskon). The major problem with silicones is to find a way to prevent the formation of gels following high-temperature oxidation of these substances. No effective antioxidants (to preclude gel formation) have yet been developed. And modification of the polysiloxane molecule, has proved to be of only limited value. Silicone oils are also very hard on rubber.

Like silicones, silicate esters exhibit remarkably good viscosity-temperature characteristics. But they, too, have a serious shortcoming: poor stability to hydrolysis. In the presence of water, silicate esters tend to decompose, yielding abrasive silica. Monsanto, a leader in synthetic lubricant research, has developed a new silicate ester product that is said to be suitable for continuous operation at 400 F. Tagged OS-45, it reportedly may be used in a modified form for short runs at 550 F.

As a synthetic lube class, the silicate esters are rather new, and not yet thoroughly investigated.

Polyglycol ethers, represented notably by Carbide and Carbon Chemicals' (division of Union Carbide) Ucons have been the subject of considerable study by industry and government. Promising in many respects, these

compounds still fall short of reaching the high-temperature oxidation stability required of jet lubricants.

It's clear enough, then, that the diesters now have a corner on the jet engine synthetic lubricant market. Right now, this lube outlet does not assume gigantic proportions. But, with the development of new, faster and hotter jet aircraft power plants, the need for synthetics will rise sharply and continuously. New engines (e.g., the J-57) are already ushering in this big swing from petroleum oils to synthetics.

In the next few years, synthetic lubricant requirements of Air Force, alone, will climb rapidly. Between July of this year and June '57, the Air Force will need 1,705,000 gal. A probable breakdown: 1955, 250,000 gal.; 1956, 601,000 gal.; 1957, 854,000 gal.

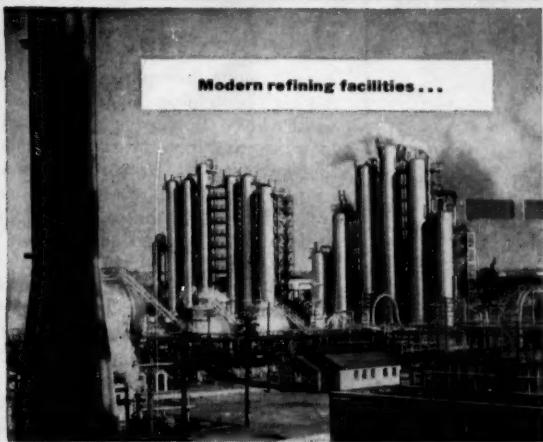
To get a piece of this business, a new lubricant must be at least as good as, and preferably better than Esso's diester. The prospects of getting this kind of performance over the -65 to 450 F range do not seem very hopeful. There's considerable belief at this point that the Air Force may be willing to yield a little on the low end of the scale to get good high-temperature performance.

And that's a tipoff on what's ahead

in synthetic lube research. It points to a move in the direction of heavier, more viscous compounds that will withstand heat even if they aren't everything that can be desired in the way of low-temperature properties. This beefing-up trend may well apply across the board, in all five chemical areas of development.

One thing, however, is sure. Synthetic lube probers will be more hard pressed than ever to keep pace with engine development. Even now, jet aircraft power plants on the drawing board pose problems that call for a wholly new approach to heat control. The lack of adequate laboratory tests for determining actual engine performance of a lubricant is perhaps the biggest hurdle to rapid progress in this connection. Each promising new candidate must be evaluated in an engine to assure valid results.

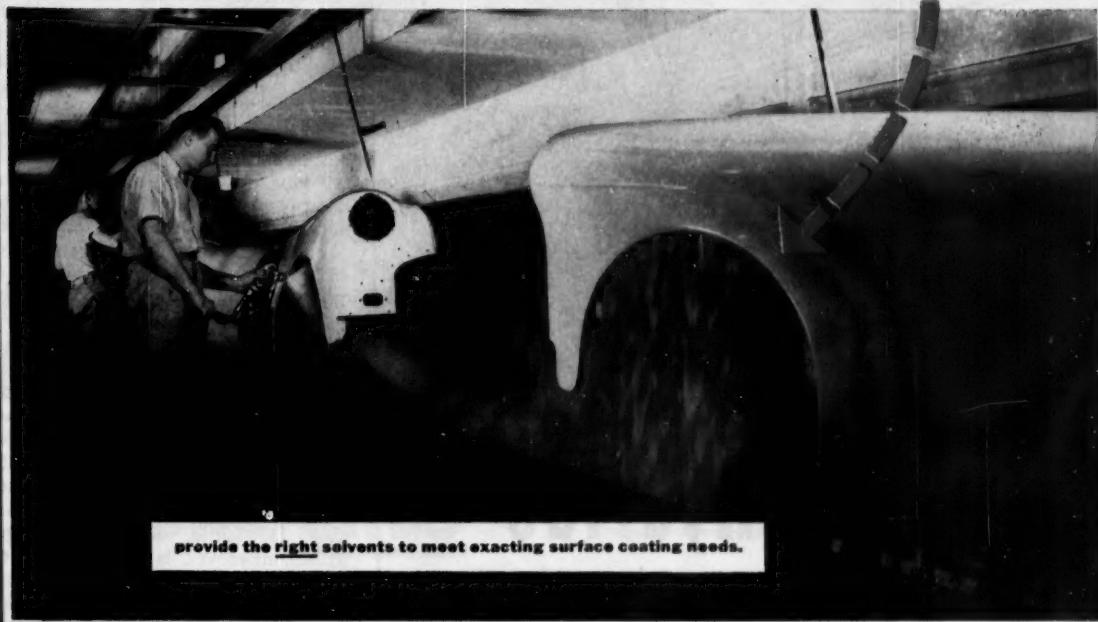
Since the only test engines are owned and operated by engine builders—e.g., Wright Aeronautic, Pratt and Whitney, General Electric, Allison, Westinghouse, etc.—this is a serious barrier behind which many potentially valuable materials are stalled. Breaking this bottleneck may well be the single most effective move in speeding the arrival of better, new synthetics for the jet age.



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RESEARCH . . .

New Boost for Algae

A continuous flow process of producing high-protein sea algae promises to yield a 4-6¢/lb. feed supplement for livestock and poultry rations. That's the word from the University of Maryland (College Park), where recent tests are said to show that algae-enriched feed causes a marked acceleration of poultry growth.

Scientists have long been interested in this single-cell chlorella-type micro-organism. Aside from its protein content, the alga contains proportionately as much carotene as do carrots.

Developed by Basic Research Corp., a nonprofit Washington, D.C., research organization, the new process yields a product that appears to be in a good position to compete with poultry feed supplements (pegged at 8-35¢/lb. of protein equivalent) now on the market.

The new process (protected by patent applications) is claimed to be over 10 times faster in lab tests than previously reported algae cultivation methods. These increased time yields are attributed largely to constant input of nutrients coupled with means of preventing bacterial destruction of the growing plant.

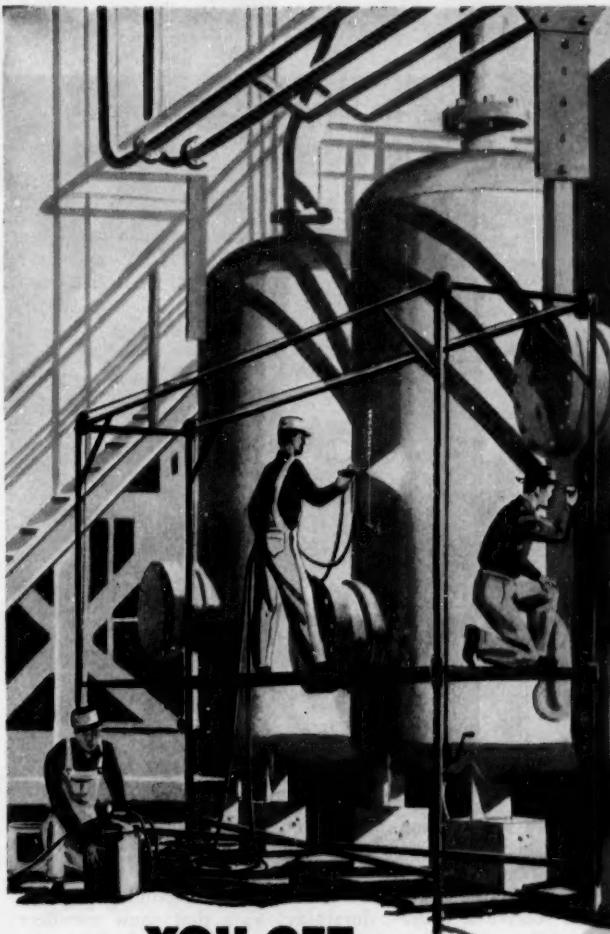
Questions: Achieving this joint goal has, in the past, been the principal roadblock to feasible algae cultivation. The new technique still has not been evaluated in large-scale tests; its commercial feasibility, of course, is yet to be proved. How it stacks up to algae-cultivation methods, developed by Arthur D. Little, Inc. (Cambridge, Mass.), moreover, is another point of uncertainty.

Basic Research Corp. is now reported to be negotiating with chemical and granary firms for commercial development of the process.

Elastic Plastics: The results of recent government research with photoelastic plastics are now available in a government publication ("Epoxy adhesives and casting resins as photoelastic plastics") available (for 75¢) from the Office of Technical Services of Dept. of Commerce.

A survey of work that was done by U.S. Army Ordnance Corps at Aberdeen Proving Ground, the report deals with epoxy resins produced by Armstrong, Chrysler and Ciba.

Also newly available from OTS is "Infrared spectra of plastics and resins," a publication (\$1.50) of Naval Research Laboratory. Feature of the bulletin: description of a new infrared absorption procedure of identifying unknown plastics, or resins.



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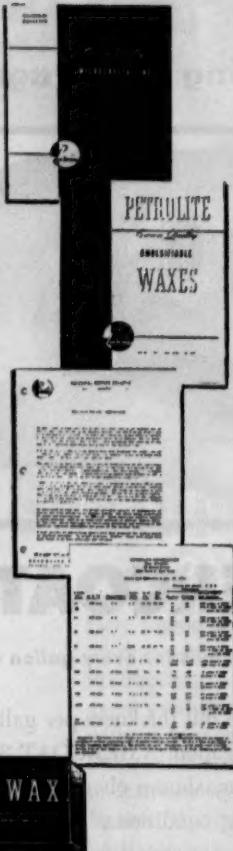
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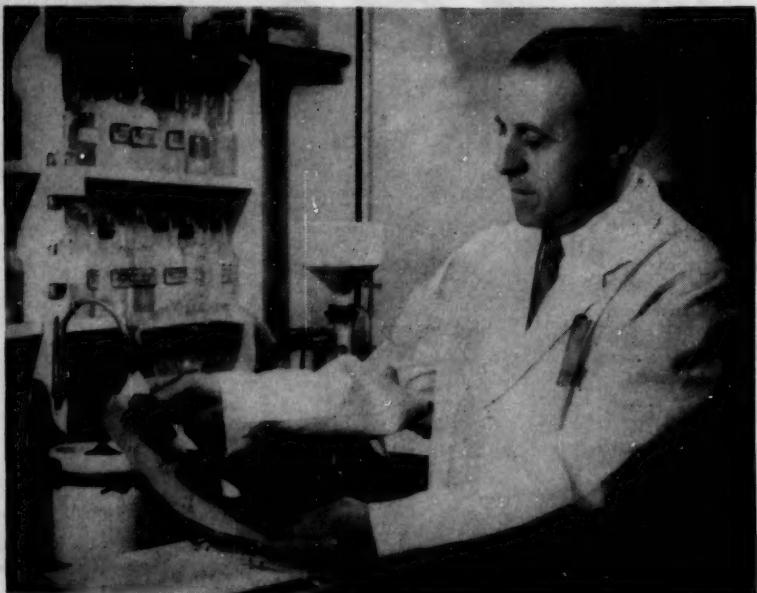


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RESEARCH . . .



HARMON'S VESCE: At the end of the rainbow, auto buyers' gold.

Keeping Up with the Ladies

The heavy emphasis on color-styling in 1955 autos hasn't caught pigment researchers unaware. Year by year, for two decades, they've watched car buyers demand and receive a wider and wider choice of hues; keeping pace with resulting requirements for better colors hasn't been easy. This week, Harmon Color Division (Haledon, N. J.), B. F. Goodrich Chemical Co., provided a glimpse of the progress that has been made, unveiled a new line of coating colorants that offer durability, brilliance, and tinctorial strength.

Sold as Harmon Indo Colors, the group comprises a series* of organic color lakes containing specially conditioned and finished vat pigments plus suitable extenders (e.g., alumina hydrate). The extender serves as a control to minimize batch-to-batch shade differences.

Nothing new chemically, the vats are anthraquinones, unique only because they were hand-picked as coating pigments after evaluation of hundreds of similar compounds.

Vincent Vesce, technical director of

* The line-up: Indo Yellow Lake E-10313 (a flavanthrone); Indo Orange Lake E-10314 (an anthanthrone); Indo Red Lake E-10315 (an oxazole); Fast Indo Red Lake E-11336 (an acridone); Fast Indo Scarlet Lake E-11337 (a perylene); Fast Indo Double Scarlet Lake E-11338 (a pyranthrone); Fast Indo Red Lake E-11355; Fast Indo Yellowish-Orange Lake E-11339 (a pyranthrone); Fast Indo Brown Lake E-11341 (an anthrimide); Fast Indo Green Lake E-11342 (a dibenzanthrone); New Pigment Fast Violet Lake E-11343 (general carbazole group); and Fast Indo Blue-Gray Lake E-11340 (an anthrimide).

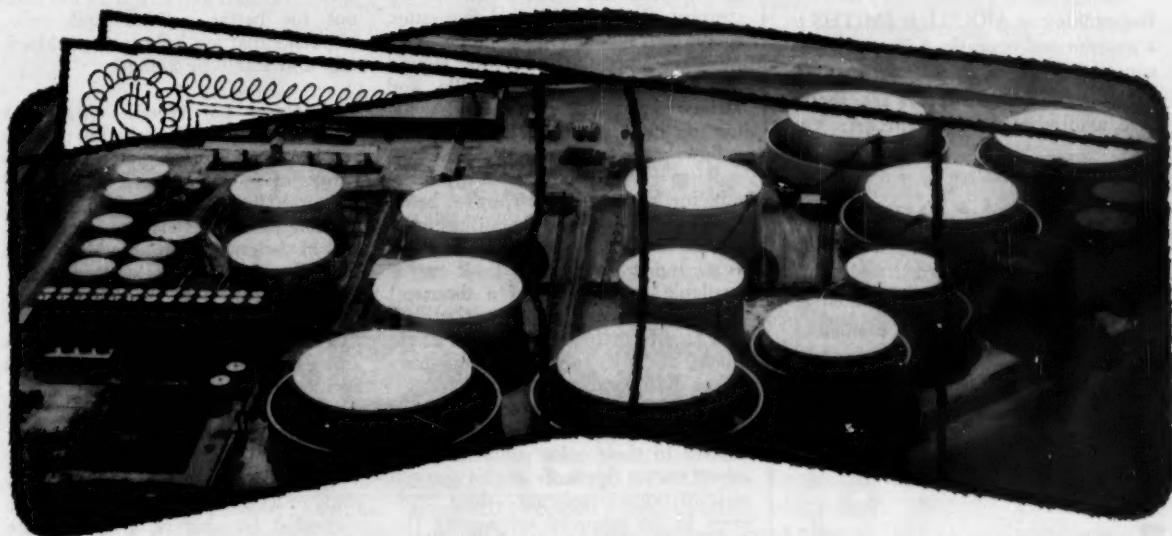
Harmon Color, says the screening program required two years, proved that there's no substitute for actual weathering tests in gauging pigment durability. Vats that show excellent resistance to real sunlight may, he explains, fail after only a few hours exposure to laboratory-fading tests, and vice versa.

After selection of likely pigments, a conditioning (drying, grinding, etc.) technique was worked out to render them suitable for finish formulation. Details of the process are still secret, and probably not patentable.

Cost of the new colorants is another novel feature. At \$12-\$18/lb., it is double or triple what paintmakers are accustomed to pay. Still, Harmon anticipates no sales problem, feels the new line is more than competitive with less durable pigments. And, the company points out, in pastel shades, colorant cost is not critical since the lake may be diluted as much as 50 to 1 with titanium dioxide. Any pigment that can stand severe weathering and exposure to sunlight at such extreme dilution is figured to be a good buy even at the higher price.

Pigment makers agree that the days of Henry Ford's famous quote about the model T, "You can have any color so long as it's black," are long gone. Recent surveys made by Ford, General Motors, and Packard not only point to growing auto color-consciousness by customers but also pretty well

as personal as your wallet

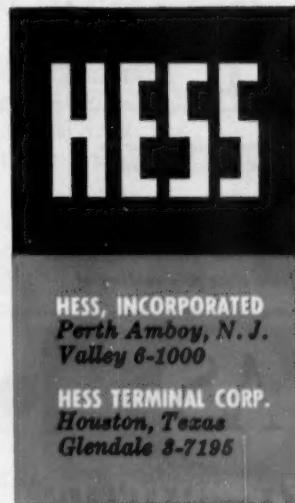


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RESEARCH

fix the principal reason for it.

Harley Earl, chief stylist for General Motors, says GM studies show that in 65% of family car purchases, women decide the color. Ford has tracked down color preferences, geographically, finds that two-tone combinations are preferred in New England; Californians like bright yellows and reds; but the Middle Atlantic States tend to more sombre-hued cars (black, blue, green) than any other section of the country. Packard surveyed five cities, found cool shades (blues, greens, pastels) most popular by a wide margin in Oklahoma City, Jacksonville, and Dallas, ahead in St. Louis, and vying for top honors with hot colors (red, yellow, etc.) in Washington, D.C.

It isn't hard to picture the job cut out for paintmakers. They're being asked to provide durable finishes in an almost limitless range of shades. This year, Buick stylists say their car is available in any one of a thousand different color combinations. Cadillac, still largely in black (its major single shade) offers its cars in 23 single-tone colors, 575 combinations.

Not all color chemists are convinced that organic pigments are the complete answer to their color problems. One expert on vat dyestuffs singles out one trait of organic colorants—their tendency to be removed on waxing the car—that will be hard to overcome. And at the color division of Reichhold Chemicals Inc. (Brooklyn, N.Y.), organic pigments have been abandoned for inorganics (chromates, etc.).

Still another question to be resolved is the relative superiority of dry pigments versus flushed colors (precipitated pigments dispersed in a non-aqueous medium). Hilton-Davis, said to be the world's largest producer of flushed colors, is understandably sold on their merits (smaller, more regular particle-size, elimination of irregularities in the finish film). The company, therefore, spends a good portion of its research energies in this direction. But dry colors (like Harmon's) are still preferred by many who fancy their better keeping qualities, greater flexibility in formulating.

Not Discouraged: But a bevy of other pigment makers are actively pushing research on the organics. American Cyanamid Co., General Dyestuff Corp. (New York), and Hilton-Davis Chemical Co. (division of Sterling Drug Inc.) are representative of firms with a strong interest in the development of vat pigments for auto finishes.

Du Pont (Wilmington, Del.), has been paying particular attention to the problem of light-fast and durable auto pigments for a number of years. Its

phthalocyanine blue (at \$3.45/lb.) and the green (\$3.95/lb.) have found their way into pastel shades for about 15 years. Other Du Pont pigments, a metallized yellow azo (\$5.50/lb.) and indanthrone blue (\$5.80/lb.), are also used in this connection.

One big outlet for new pigments is in "attention arresters," special shades calculated to attract attention to a particular make of car. In this respect, the auto industry is on the lookout for better yellows and reds—pigments that are light-fast, nonbleeding, and stable in storage.

Bad News for Weeds: Four new classes of potentially valuable agricultural chemicals are highlighted in the results of recent research at Stanford Research Institute (Stanford, Calif.). Seeking substances that are more selective in their weed-killing activity than the phenoxyacetic acid derivatives, 2,4-D and 2,4,5-T, the Stanford investigators uncovered substantial activity (30-90% of 2,4-D) in certain amides, glycerine derivatives and alkyl aryl ethers; a fourth group, heterocyclic nitrogen compounds, exhibited marked growth-stimulating properties, according to the probers.

The SRI work was launched with a study of 23 likely herbicide candidates suggested by staffers. Although the exact identities of their promising discoveries have not been disclosed, SRI researchers do state that indications of activity were obtained in several compounds that were not previously considered growth regulators.

Safety Factor: Chemists of the Australian pharmaceutical firm, Nicholas Pty. Ltd., (Melbourne) seem to have backed into the discovery of a potent new barbiturate antagonist. In quest of new analgesics, company researchers were attracted (by a literature survey) to the possibilities of glutaric acid imides. Several of the compounds were synthesized and submitted to the University of Melbourne's pharmacology department for screening. University pharmacologists soon discovered that they did not have an important new group of analgesics, but one compound—methyl ethyl glutarimide—produced curious results in animal experiments: cats given ordinarily lethal doses of barbiturates made unexplained recoveries if they also received the test agent. In clinical tests thus far 20 cases of barbiturate overdosage—some critical—were treated successfully with the drug.

Stopcock Ouster: A new buret produced by Emil Greiner Co. (New York) offers one way to bypass stop-

ACRYLO-NEWS

AERO* Acrylonitrile, a highly stable bi-functional chemical, is finding increasing use as a reactive intermediate. Its versatility is indicated by its use in the preparation of pharmaceuticals, insecticides, surface active agents, and many other useful products as well as by direct application in the broad fields of rubber,

plastics and textiles. Its polymers and copolymers can be formulated to add many desirable properties to today's products and to create interesting new products for the future. The following items and abstracts, gathered from many sources, indicate a few facets of current research with this versatile chemical.

★ ★ ★ ★ ★

CELLULOSE ACETATE PILE IS SECURELY ANCHORED TO A BACKING WEB by an acrylonitrile rubber adhesive. The high initial tack of the adhesive holds the pile fibers impelled against it, and a strong permanent bond is obtained by vulcanization of the nitrile rubber. Pile-surfaced fabric prepared in this manner is soft to the touch and resistant to dry-cleaning solvents.

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ACRYLONITRILE WILL CONDENSE WITH FORMALDEHYDE to form hexahydro-1,3,5-triacyllyl-s-triazine, a reactive polyfunctional compound. One of the uses for the triazine is in textile printing pastes containing vinyl polymers or copolymers as pigment binders. Cross-linking of the polymer vehicle by the triazine makes the fabric prints resistant to rubbing and washing.

INCREASED UTILITY OF A SYNTHETIC DRYING OIL FOR ENAMELS is obtained by the use of acrylonitrile. When copolymer butadiene-styrene drying oils, used as enamel vehicles, are reacted with small quantities of acrylonitrile, better pigment wetting power results. The final enamel has good uniform gloss.

QUEOUS DRILLING FLUIDS ARE MARKEDLY IMPROVED by the addition of a modified sodium polyacrylate offered by CYANAMID'S Refinery Chemicals Department. Derived from acrylonitrile and stable at elevated temperatures, this compound effectively controls water-loss from drilling muds. Furthermore, it is resistant to chemical and bacterial attack.

(Some or all of the above items are covered by U.S. or foreign patents)

★ ★ ★ ★ ★

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RESEARCH

cock problems in extremely fine analytical work. Equipped with glass-and-plastic needle valves, the new burets reportedly permit easy control of flow for very fine micro measurements. Calibrated in accordance with Bureau of Standards tolerances, the needle valve burets are also available in micro sizes. Construction feature of all: only glass and Teflon comes in contact with contained liquid.

Key Book: A new monthly, government publication, "U.S. Government Research Reports," indexes federal research projects by industry classification. Containing a section devoted to chemicals and allied products, it also covers research reports of foreign governments. The publication is available from the Superintendent of Documents (Washington 25, D.C.) for \$6/year.

Ready to Build: Spencer Kellogg and Sons, Inc. (Buffalo, N.Y.) expects to start construction soon on a \$500,000 research center at Cheektowaga, near the Buffalo airport. A two-story, brick main building and a single-story pilot plant are scheduled for completion by April '55. Subject of research will, of course, be vegetable oils and fats.

Two Standards: Cycloheptane and 2,4-dimethyl-1-pentane are the latest standard hydrocarbon samples from the American Petroleum Institute. Price of each: \$50 for 5 ml. They can be ordered from API's Frederick Rossini at Carnegie Institute of Technology (Pittsburgh, Pa.).

Novel Walls: Insulated precast concrete panels will be used on the outside walls of Electro Metallurgical Co.'s (division of Union Carbide and Carbon) \$500,000 chemical engineering research laboratory in Niagara Falls. The building will measure 142 x 77 ft., is said to be the first to utilize this easy-to-fabricate type of wall in western New York.

New Program: One of the first arrangements of its kind is the University of Michigan's (Ann Arbor) new plan for large-scale industrial participation in the fruits of the school's research. For a subscription fee of \$15,000 (payable in full, or in three annual installments of \$5000), the college of engineering will make available summaries of its current research and development activities, arrange meetings and symposia with member firms. The university expects the plan to be of mutual benefit to faculty, students, and participating firms.

The Industries We Serve—PHARMACEUTICALS



W&D-4971

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Life Expectancy: 69 years

LUCKY Junior! If he drives his rocket car carefully and doesn't overheat his atomic furnace, he's slated to spend a nice slice of his life in the 21st Century. He won't be haunted by most of today's diseases, that's certain. For medical science, hand in hand with the Pharmaceutical Industry, is already knocking off these killers, one by one. And chemicals from coal are right on the firing line.

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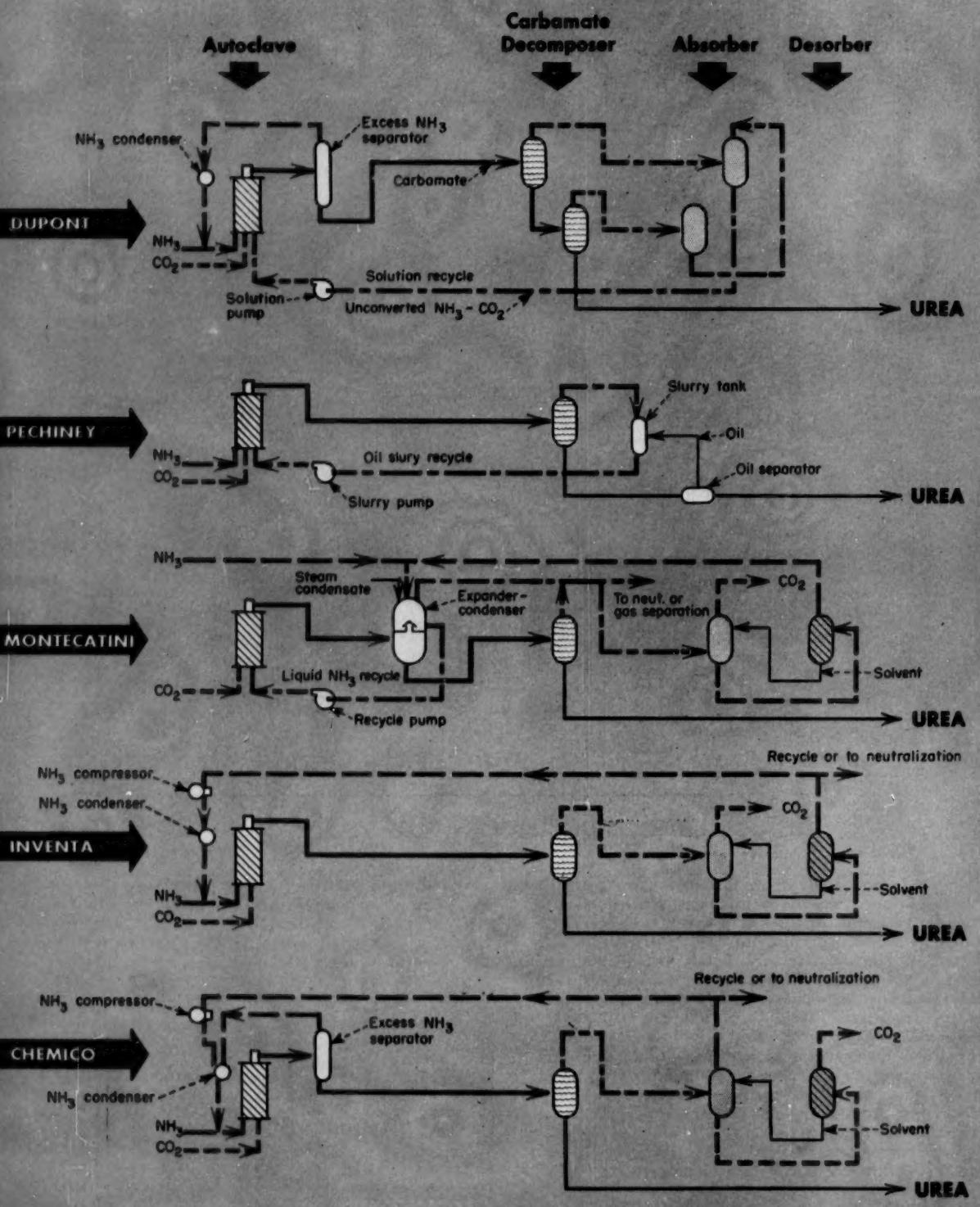
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PRODUCTION

Story continues on p. 90

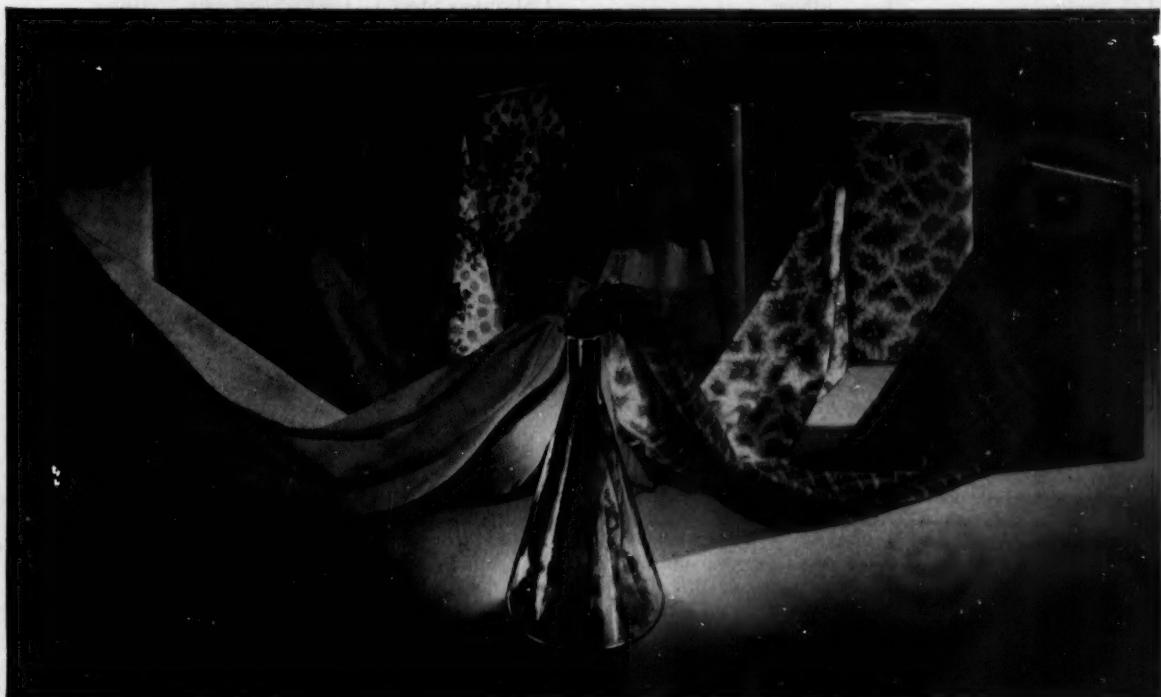
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Five Urea Processes—How They Compare

	Du Pont	Pechiney	Montecatini	Inventa	Chemico
Type of Operation	Unconverted carbamate is recycled in an aqueous solution of ammonia.	Unconverted carbamate recycled as a slurry mineral oil.	Most unconverted carbamate is recycled with steam condensate in liquid NH ₃ . Tail gas is separated by selective absorption of ammonia.	Unconverted gas is separated by selective absorption of ammonia, recompressed and recycled.	Unconverted gas is separated by selective absorption of carbon dioxide, recompressed and recycled.
Reactor Conditions:					
Temperature (C)	200-210	180	180	180-200	175-185
Pressure, atm.	400	200	200	200	170
Lining	Silver	Lead	Stainless Steel	Undisclosed	Silver
NH ₃ : CO ₂ : H ₂ O	5 : 1 : 0.73	2 : 1 : 0	3.4 : 1 : 0.84	2+ : 1 : 0	6 : 1 : 0
CO₂ Conversion:					
in autoclave	70%	50%	52%	50%	76%
Total	70%	50%	88%	50%	76%
NH₃ Conversion:					
in autoclave	24%	50%	30-32%	50%	25%
Total	24%	50%	72.5%	50%	73%

Urea: Product Skirmish, Process Scramble

Just a few years ago, activity in urea seemed to be hitting an all-time high. But strides today make the earlier pace pale by comparison: three new plants are starting up this year; construction on a fourth will get under way within a few weeks; a tentative plant site has been selected for a fifth, while a sixth remains a question mark. And ready to meet this production challenge is an impressive array of processes.

The driving force behind all these moves is the pronounced trend toward production of more concentrated fertilizers. By the time the capacity that's presently planned is in place, a significant portion of the U.S. synthetic nitrogen capacity will be diverted to urea production.

Who's News: For a long time, Du Pont had the urea field pretty much to itself. A commercial producer since 1933, it has gradually boosted its capacity to its present level—probably 140,000 tons/year. But Allied, which started operations in La Platte, Neb., in July, is probably top contender right now. With its two plants (at South Point, O., as well as La Platte), it can probably make as much as 190,000 tons/year. Here's how the other producers—new or prospective—stand today:

- Deere & Co., the farm ma-

chinery maker, is starting up its new \$18-20 million ammonia-urea project in Pryor, Okla., this month. If it converts all the ammonia into urea, Deere will make 260 tons/day. The plant, built by Foster Wheeler, will mark the U.S. debut of France's Pechiney urea process.

- W. R. Grace is putting the finishing touches on its Woodstock, Tenn., ammonia-urea plant, expects to start producing urea shortly. Like the Deere project, Grace's will employ the Pechiney process.

- Standard of Ohio has contracted for a 120-ton/day urea plant to be built at Lima, O. Slated for completion in the fourth quarter of next year, the plant will be the first in the U.S. to produce urea by the Swiss Inventa process, licensed here by Vulcan Copper & Supply* (Cincinnati).

- Canada's Consolidated Mining & Smelting (Cominco) is showing a decided interest in building a urea plant in the Pacific Northwest. Although Cominco has not committed itself as yet to any line of action, its engineers are studying the various urea processes. And the firm has a plant site along the Columbia River in Oregon under consideration.

* Hydrocarbon Research is currently working on a Vulcan-engineered Inventa installation for the Taiwan Fertilizer Co. (Formosa).

- American Cyanamid is another potential (though doubtful) starter in the urea race. The company is still guarding its plans. In case it should go ahead, the plant will be located in Avondale, La., adjacent to its ammonia operation there, would undoubtedly employ the process of its offspring, Chemical Construction.

Costs Come High: You can't get into urea production on a shoestring. For one thing, the economies of the operation call for a captive source of ammonia—and ammonia plants don't come cheap. Then, the nature of the business necessitates a fair-size operation; 50 tons/day is probably the minimum. And the investment in the urea plant itself runs between \$10,000 and \$30,000 per daily ton.

Making urea itself is no cinch, either. Here's why: the chemistry of all the present commercial routes to urea is identical. Ammonium carbamate is formed from ammonia and carbon dioxide, then decomposed to urea and water. The formation of the carbamate is highly exothermic, calls for careful control. And although it goes much better at high temperatures, it takes place only in the liquid phase. So high pressures must be employed. And the mixture is highly corrosive under those conditions.

What's more, conversion into the

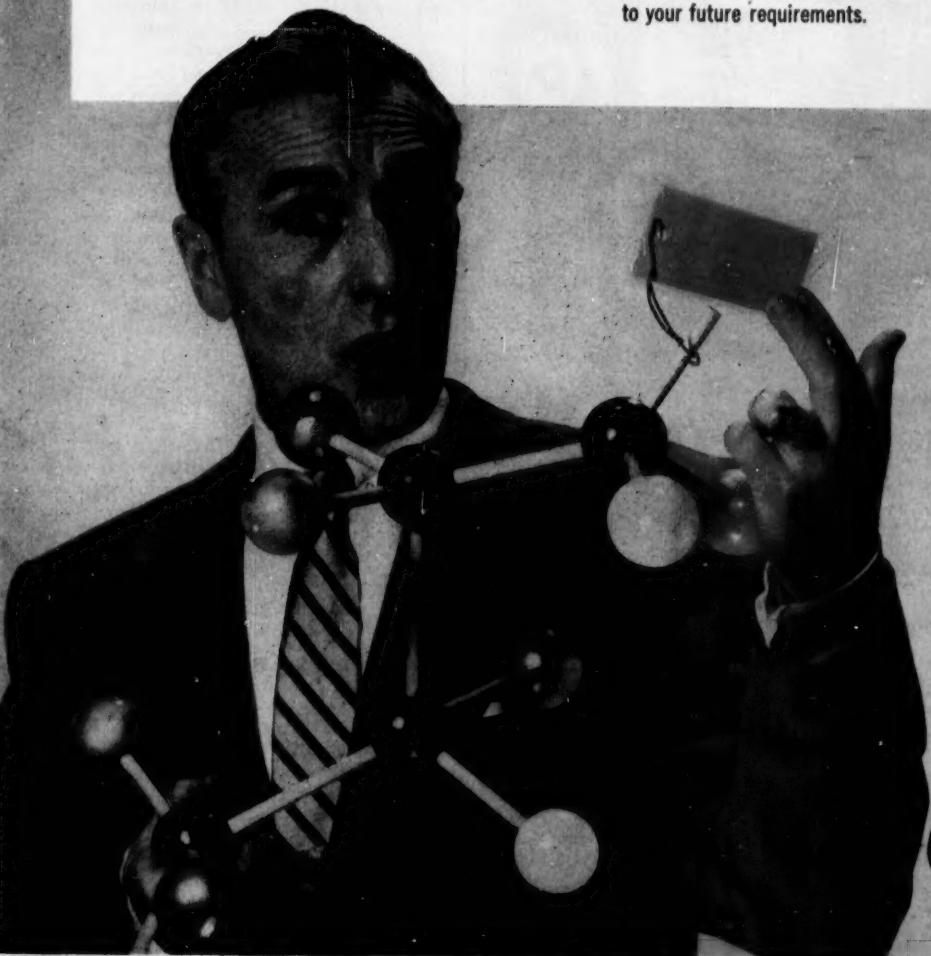
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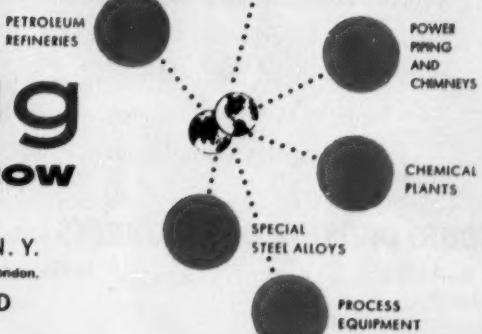
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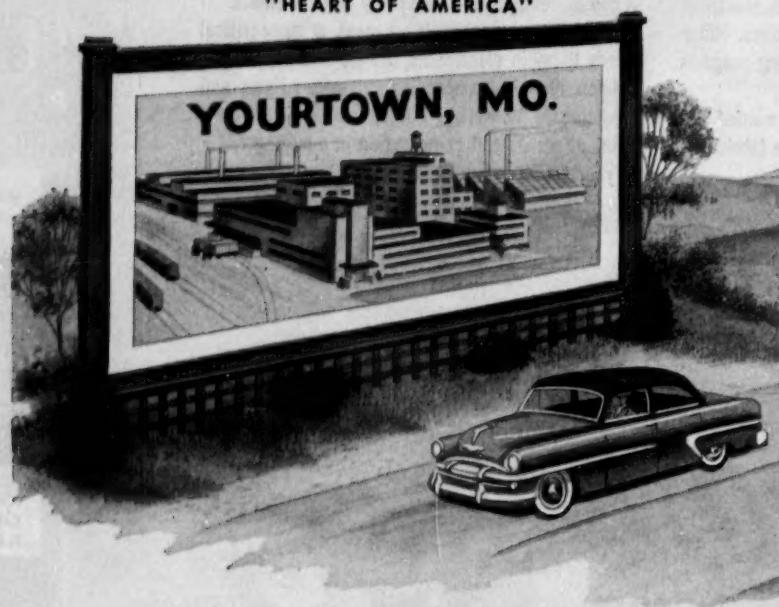
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PRODUCTION . . .

carbamate is incomplete and the excess ammonia must be either recovered (and converted into another form) or recycled. Recycling is the more attractive alternate, but when the unconverted mixture is recompressed to the reaction pressure it tends to solidify and clog the reactor.

What it comes down to, then, is that some means must be taken to prevent the mixture from solidifying to the carbamate in the reactor. That's just what the various processes do:

- Du Pont, using its own process, employs a 150% excess of ammonia to drive the reversible carbamate reaction in the desired direction. About 84% of this excess is stripped from the carbamate as it leaves the reactor for recycle as liquid ammonia. Unconverted gas from the carbamate decomposer is condensed and absorbed, then recycled as an aqueous solution.

Recycling in an aqueous solution prevents the carbamate from solidifying as it is recompressed. The water and excess ammonia take care of the heat transfer in the autoclave, but require higher pressure than would be necessary if water were not present. Conversion of carbon dioxide into urea* is believed to be about 70%.

- The Pechiney process is an offshoot of I. G. Farben's hot-gas recycle. Corrosion and carbamate solidification are eliminated by recycling the unconverted material as a slurry in mineral oil. Reaction heat, absorbed by the oil, is carried over into the carbamate decomposer to aid the endothermic dissociation.

- The Montecatini process uses excess ammonia to increase conversion, offers a choice of partial or total recycle. Carbamate from the autoclave passes into a combination expander-condenser where excess ammonia is removed. Together with some of the unconverted carbon dioxide, the ammonia from the expander section mixes with steam condensate and make-up ammonia entering the condenser section. The resulting solution of carbamate in liquid ammonia is returned to the reactor where it absorbs the heat of reaction. Corrosion is reduced sufficiently by this method to permit the use of stainless steel construction in the autoclave.

Carbamate from the expander passes to a decomposer, dissociates to urea, water and unconverted gas. The gas passes off to a separation process in which the ammonia is selectively

808

* Conversion into urea is calculated on a CO₂ basis for the purpose of comparing the various processes. Ammonia cannot be used as a basis since the presence of excess amounts distorts the values.

MISSOURI DIVISION OF RESOURCES AND DEVELOPMENT
Dept. K-485

Jefferson City, Missouri

DAVISON BULLETIN

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Appearance	uniform, free-flowing powder
Density	
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centrifuged in toluol	7.5 lbs./cu. ft.
true (specific gravity)	2.1-2.2
pH	7.2
Silica as SiO ₂ (dry basis)	99.5%
Oil adsorption	240 lbs. oil/100 lbs. SiO ₂
Surface area (nitrogen)	292 M ₂ /gram

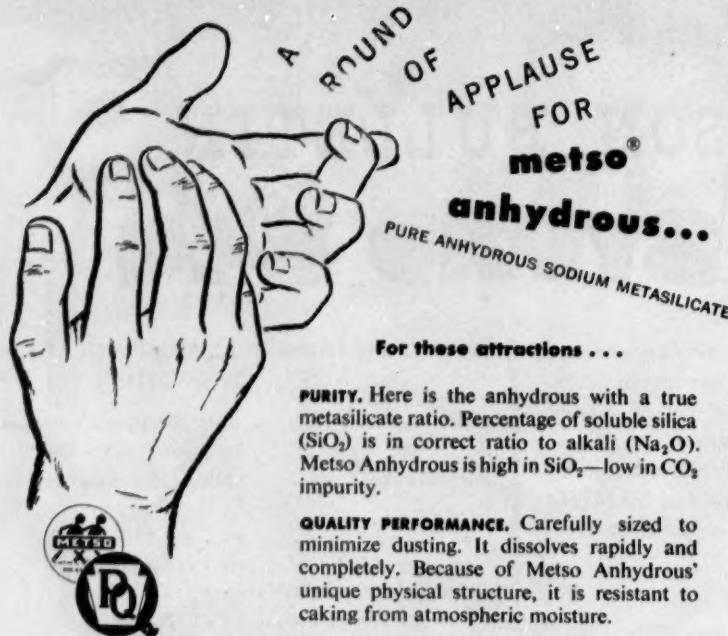
PARTICLE SIZE DISTRIBUTION BY WEIGHT

(water sedimentation)

5% less than 1.1 microns	
10	1.4
20	2.0
40	3.0
50	3.7
60	4.5
80	7.0

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PRODUCTION . . .

absorbed by aqueous urea nitrate solution. Desorbed in a solvent regenerator, the ammonia may be recompressed, condensed and recycled as fresh feed to the system. Carbon dioxide from the absorber is vented or recycled.

Though not yet used in this country, the Montecatini process is employed by the Nissan Co. (Toyama, Japan) for its 15,000-ton/year plant. And Montecatini's own three plants in Italy produce about 75,000 tons/year. It's licensed in this country through M. W. Kellogg.

• The Inventa process, developed by the Hovag Co. of Switzerland, is a gas recycle method. All of the unconverted gas from the carbamate decomposer is separated by selective absorption of the ammonia with aqueous urea nitrate. The total recycle of unconverted materials as gas eliminates the problem of recompressing carbamate.

One of the chief advantages claimed for this process is the low maintenance cost made possible by a specially developed lining material (of undisclosed nature). Since there is no liquid recycle to absorb heat in the autoclave, heat transfer surface is provided to utilize the heat for steam generation.

• Chemico's process is a gas separation method employing an excess of ammonia in the reactor. It differs from Inventa's separation in that carbon dioxide is absorbed, using monoethanolamine as the extracting solvent.

By operating with a large (200%) excess of ammonia, the yield is stepped up to 76%. Approximately 98% of the excess is stripped from the autoclave product, condensed and recycled with feed make-up.

Chief advantage claimed for the Chemico process is the reduced quantity of tail gas that must be recompressed and condensed. Ammonia from the absorber and carbon dioxide from the monoethanolamine regenerator are returned to the fresh feed supply. (This process is used by the Sumitomo Co. [Niihama, Japan] to produce 120 tons/day.)

All this puts urea in a unique position. Its synthesis in 1828 is usually credited as the birth of organic chemistry. But it wasn't until 105 years later that large-scale U.S. production got under way, and production men have faced no mean task in trying to develop processes that are compatible with plant equipment. The new plants, new processes and ambitious plans indicate how well they've met the challenge. And they've come a long way since Wohler.

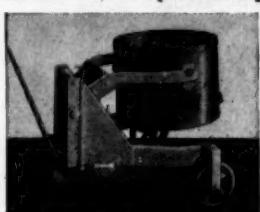
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DEPENDABLE DRIVE



PLANNING AND MEASURING are two principal ingredients of pollution program.*

Investments in Goodwill

There's a lot to be said for taking a positive approach to any subject. On occasion, however, the best way to emphasize the positive is to accent the negative. That's what Cleveland's Division of Air Pollution Control is doing in reporting to the public just what the city's process industries are doing to clean up the air.

Briefly, the theme that's being played up is not so much what's being done but how much dust will not fall as a direct result of industrial efforts to cut down pollution. By placing dust jars strategically throughout the city, the division was able to calculate that

over 400 50-ton freight cars of dust will not fall on the city this year.

Cooperative Effort: Howard Scott, commissioner of the division, feels that this represents real progress in the drive against pollution. Credit for the progress, he feels, belongs to industry and the cooperation it has shown. Says he: "We feel it is our responsibility to present the need for improvement to industry, leaving to management the solution or method of obtaining compliance. Active cooperation is the key to success of air pollution control."

In Cleveland as elsewhere, it's sul-

fur dioxide and fly ash that are playing in their familiar role of villains. And reducing them to their present stage of ineffectiveness has cost Cleveland industry over \$100 million since 1947. U.S. Steel, for instance, spent over \$2 million to purify its blast furnace gas. The money went for gas scrubbers, electrostatic precipitators a sludge removal unit (Dorr thickener) along with instruments to control and record the process variables. The net result: the gas discharged by blast furnace is 99% free of contamination (see cut).

Republic Steel Corp. has similar equipment installed on its Cleveland furnaces; Jones & Laughlin has dust catchers and scrubbers without the precipitators. And chemical process companies have spent comparable amounts in the interest of cleaner air. Not all, of course, spent such large amounts. Standard Oil, for instance, managed to purify its refinery effluent for \$25,000, or about 5% of the original estimate.

But the code will be tightened up next year. And Cleveland industry can be expected to shell out many more millions to keep more freight cars of dust from falling.



RESULTS are evidenced by this picture of U.S. Steel's smokeless stacks.

* Discussing causes and extent of paint discoloration in a section of Cleveland are Leonard Goldston and Fletcher Miles, senior chemists in the bureau of industrial nuisances; Leroy Diehl, assistant to the air pollution commissioner; Scott; John Hodges, chief of the bureau of smoke abatement; and Harold Cutter, chief of the bureau of industrial hygiene. Examining the impinger is Cutter, while Scott and Lazar Melanovich, laboratory assistant, look on.



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How? Grace Chemical's \$20,000,000 plant, opening soon in Memphis, Tennessee, will produce 72,000 tons of nitrogen a year as urea and anhydrous ammonia. That's enough nitrogen to increase the nation's corn crop by 72 million bushels. At 1954 prices, that would put an extra \$100,000,000 or more into the pockets of the American farmer.

Corn is only one example. Actually, there will be many applications for this nitrogen: as fertilizer for other feed and fiber crops; as a protein source for feed supplements; for industrial uses such as the manufacture of plastics, synthetic fibers, pharmaceuticals, and in petroleum refining.

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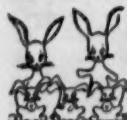
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PRODUCTION . . .

EQUIPMENT

Flow Meter: Devicengineering Co. (Philadelphia) has a new variable area flowmeter Model 1-100 for continuous measurement of corrosive or noncorrosive gases and liquids. Designed to provide the installation simplicity and economy of a differential orifice, the new instrument is available in $\frac{1}{2}$ - to 12-in. sizes, can handle flow rates of 0.2 to 2000 gpm. of liquid, 10 to 60,000 lbs./hour of steam, or 1 to 6000 cfm. of gas. It's made in a variety of alloys and plastics.

Arc Furnace: General Electric unveiled a new multipurpose arc-melting furnace at the recent National Metal Exhibition in Chicago. A product of GE's research on novel methods of producing high-temperature alloys, the new furnace employs an inert atmosphere, can handle ordinary metals and others, such as titanium, previously considered too refractory for commercial production.

Housekeeping Aid: Model 500-55 Twin Powered Vacuum is a giant-size industrial cleaner, manufactured by



Better by Half

CHECKING OUT a new coil insulation material for coil power factor, the operator above finds it's substantially lower than for conventional systems. The new insulation, called Polyex, uses polyester tape (Pacron), a polyester film (Mylar) and a hydrocarbon resin. It's said to boost life of coil insulation by 50%. It is becoming available on General Electric induction motors rated between 100 and 3000 hp.

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SULFATES.....	0.001% MAXIMUM
ORGANIC MATTER ..	0.0002 % MAXIMUM
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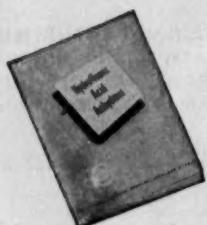
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PRODUCTION . . .

American Cleaning Equipment Corp. (Chicago), for picking up heavy bulk waste and scrap. It is claimed that the new model's large air volume permits the use of 3-in. I.D. pickup hose, handles bulk materials that previous industrial cleaners could not.

Plastic Seal: A new series of thermoplastic pipe flanges and couplings, developed by Columbia Basin Plastics Co. (Portland, Ore.), offers a simple method of installing positive seals. Key to the unique joining operation is a small wire ring placed in the fitting where it joins the pipe. Heated by a portable induction unit, the ring melts surrounding plastic, fuses the two pieces into one solid unit. Designed primarily for polyethylene and fluorocarbon couplings, the fittings are also superior to adhesive welds with tenite.

Continuous Blender: Proportioners, Inc. (Providence, R. I.) is now offering a new two-component blender as a complete equipment package. Designed for continuous automatic blending, the system is claimed to assure accurate uniformity at a lower cost than that of slower, manual batch-mixing methods.



Safety Sentinel

STANDING GUARD over Eastman Kodak's chemical plant (Rochester) is a battery of these new safety devices. Should a safety valve in the plant blow off, the lower portion will hold the liquids while the dome on top will separate liquid particles from escaping air.

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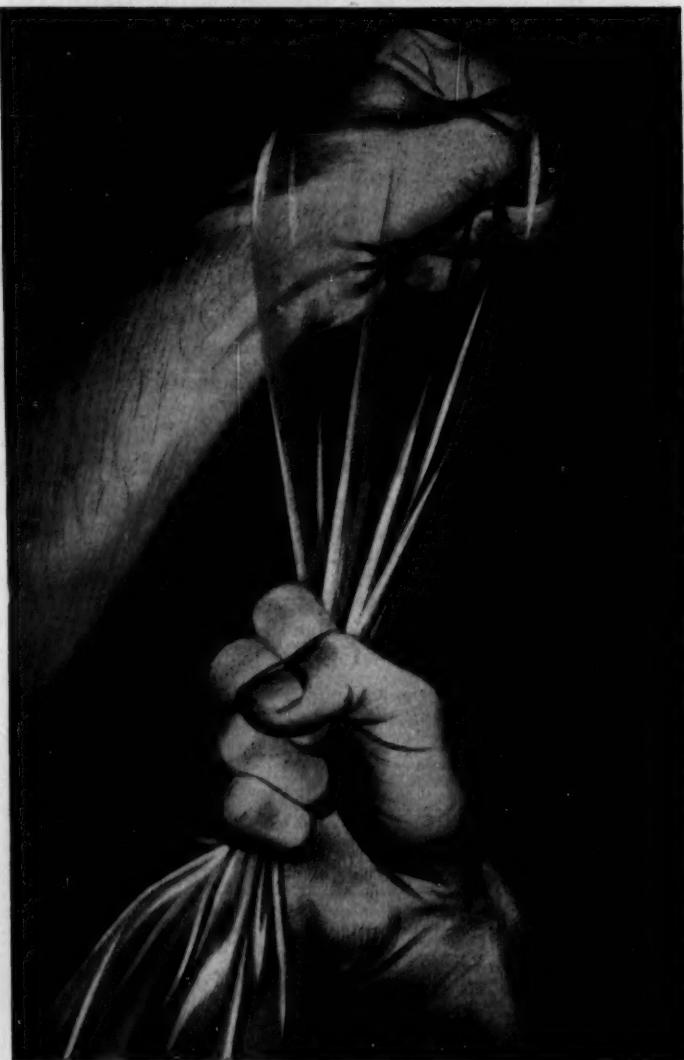


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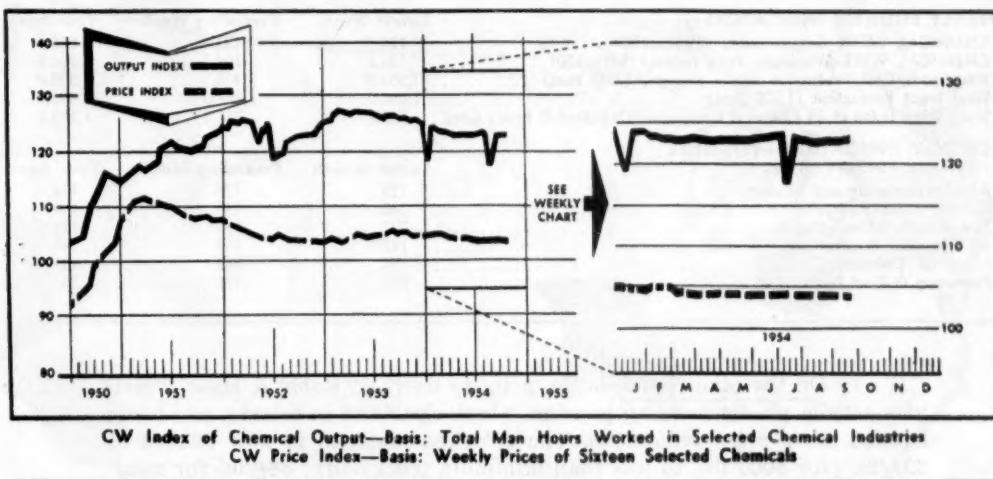
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MARKETS



MARKET LETTER

Marketers of basic chemicals continue to ride the crest of higher autumn sales. Most such items, by now, are moving in fairly good volume.

For example, anhydrous refined sodium sulfate, along with Glauber's salt, is reportedly leaning toward the tight side of the market. And salt cake, long in the short-supply category, shows little promise of any immediate easing. Demand from glass plants and stepped-up kraft pulp production (the latter is the sulfate's biggest customer), along with slackening output of rayon and other by-product cake output, combine to intensify the current salt cake squeeze.

Though there's little likelihood that anyone contemplates putting up a plant to produce the material, more than a few paper producers, nudged by the supply situation, are finally getting around to modernizing and improving their equipment.

Steady glass industry calls, too, added to other unwavering industrial demands, are keeping borax and boric acid producers in a happy frame of mind. Shipments are—and have been—broad enough to preclude much stock accumulation. Indeed, some observers indicate a slight pinching of supply.

At any rate consumers of borax, boron compounds and the acid, won't be nicked for higher prices, for a while at least. Late last week, Pacific Coast Borax tendered 1955 contracts quoting no change in current schedules. Though it hasn't been announced, American Potash & Chemical and Stauffer tell *CW* they too will hold the line on prices in new contracts, with, of course, the usual price adjustment clause.

Earlier, some chromic acid and bichromates sellers, also currently booking contracts for 1955 delivery, extended prices into the new year. Demand for the products have been at a slightly brisker pace, compared with earlier summer calls, and market followers envision a continuing steadiness in movement. Consensus: no signs of weakening, yet no signs of any booming, and definitely, no price hikes in the near future.

MARKET LETTER

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
CHEMICAL WEEK Output Index (1947=100)	124.1	123.9	125.4
CHEMICAL WEEK Wholesale Price Index (1947=100)	104.2	104.3	104.9
Bituminous Coal Production (daily average, 1,000 tons)	1,503.0	1,418.0	1,549.0
Steel Ingot Production (1,000 tons)	1,890.0	7,892.0	1,956.0
Stock Price Index of 13 Chemical Companies (Standard & Poor's Corp.)	345.3	341.0	255.0

MONTHLY INDICATORS—Production

	Latest Month	Preceding Month	Year Ago
All Manufacturing and Mining	129	126	136
Durable Manufactures	140	135	154
Non-durable Manufactures	122	119	122
All Chemical Products	147	143	145
Industrial Chemicals	156	153	151
Petroleum & Coal Products	126	126	131

On the other hand, large quantity users of Rohm & Haas' Plexiglas acrylic plastic molding powders (both clear and in colors), are being handed some price reductions. The colorless material is now offered at 69¢/lb. (for 5000 lbs. to less than minimum truckload); 68¢/lb. for minimum truckload and over. Formerly, the lowest price was 70¢.

Standard and stock colors are tagged at 72¢/lb. for minimum truckload and over. All prices are f.o.b. plant.

Chances are slim that toluol tags will be lowered, despite some murmurs of a buyers' market. Low coking operations in the steel industry during the summer months was an effective supply/demand-balancer (*CW Market Letter*, Aug. 28), and, conversely, the pickup in steel output is beginning to show in increased toluol availability.

Most producers, however, still report little braking in toluol movement to industrial consumers. Chief complaint seems to be that total demand just isn't heavy enough to blot up all capacity.

The same situation is applicable to benzol. No price changes are anticipated, but observers are closely watching the increase in steel production. The concomitant outpouring of coke-oven benzol, many feel, will affect the consumption rate of the petroleum-derived material. Overall demand, though, is perking somewhat, and the gradual firming is expected to extend well into the new year.

More surge than perk in synthetic rubber demand is behind this week's boosting of production plans by the Federal Facilities Corp., the agency that now runs the government plants. Tire makers, other consumers say they will need these amounts of GR-S during the next three months: December, 50,000 long tons; January, 47,000; and orders for February delivery total 49,000 tons.

FFC attributes the new business to the current increase in overall rubber consumption, especially the heavy demand for tires from new car producers (see p. 107), together with the recent hike in natural prices.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending November 22, 1954

UP

	Change	New Price		Change	New Price
Amyl alcohol, fermented, refd., 128°, 132° C, dms., l.c.l., divd.	\$.09	\$.43	Iodine, crude, kgs.	.30	1.45
Coumarin, cryst., N.F., dms.	.25	3.10	Naphthalene, crude, imp., 78°, large lots	.0025	.05

All prices per pound unless quantity is stated.

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179

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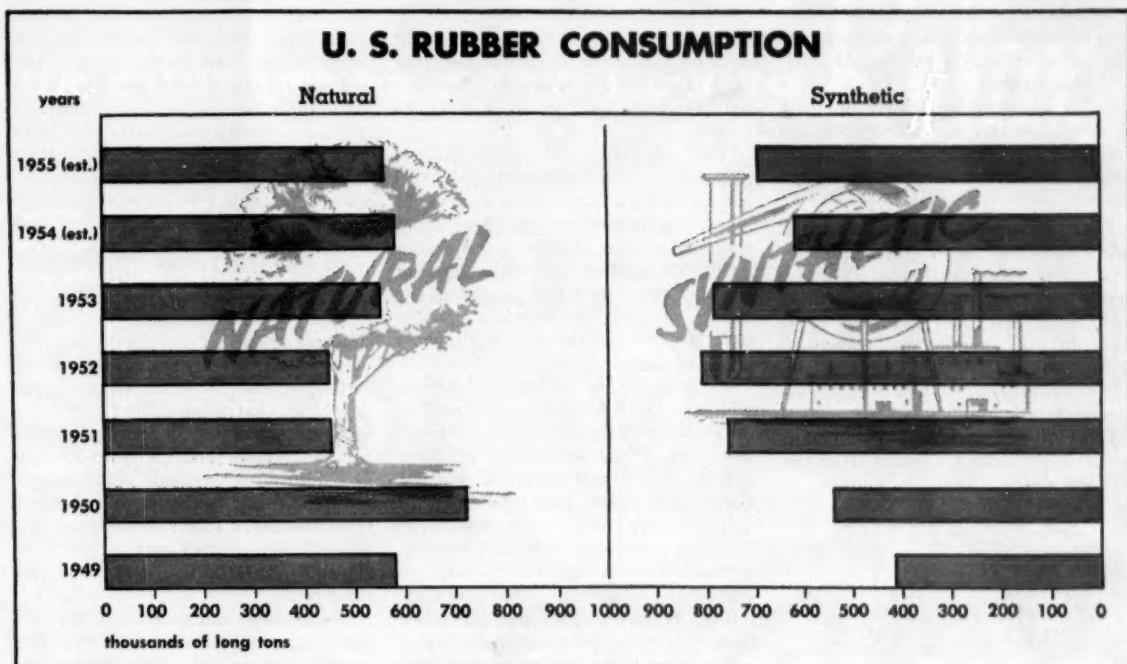
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Tires' Hum: Song for Chemicals

Hottest topic in the nation's business centers these days is rubber. And though the discussions have a decided rubber industry overtone, chemical marketers' attention is focused on these current rubber events:

- News that four—and perhaps more by now—companies have reached the contract-signing stage in their bid to buy the government-owned synthetic rubber plants;

- Rapid-fire unveiling of the new 1955 model automobiles, revealing a first-time mass adoption of the revolutionary tubeless tire as original equipment;

- Estimates that indicate that total U.S. rubber consumption, both for transportation and nontransportation uses (*see end use pattern*), has touched the bottom of this year's dip, will, by '55, again begin a climb that could continue for several years.

The chemical industry's attraction to things rubber, of course, is quite understandable—it's basic economics. Even this year's 1,204,000 long ton consumption level (about 134,000 under last year's), represents perhaps \$450-500 million worth of consumed chemicals. A breakdown of some of the major chemical commodities required annually by the rubber industry includes items such as anti-oxidants and accelerators (about 130 million

lbs.), zinc oxide (160 million), carbon black (an impressive billion lbs.), perhaps a total of 60-65 million gal. of plasticizers and solvents. Add too, sizable quantities of sulfur, lime, litharge, talc, mold lubricants and a host of others.

Tire Touchstone: Thus, chemical sellers, keenly attuned to happenings to one of their best customers, in chain-like fashion, also follow the fortunes of rubber's biggest user, the automotive industry.

By the end of this year, an estimated 765,000 tons of rubber—a near-65% of the total amount of synthetic and natural consumed in the U.S.—will have gone into transportation outlets like tires, tubes, and tire sundries. (Compare that with the 435,000 tons filtering into nontransportation uses.)

Although the modern automobile has more than 530 other rubber parts (e.g., fan belts, wiring, foam cushions), the tire is the greatest single item made. Note this shape-up of output: in 1940 about 60 million tires of all types were produced; in '53 production reached almost 93 million; and, within four or five years, after 1954's dip to some 88 million, tire production is expected to hit close to 125 million.

The increase points up the growing need for rubber for all uses. But the

output of natural rubber continues to fall short of world demand. Production of natural will not likely increase much beyond the current rate of production (about 1,730,000 long tons), hence the widening gap in supply must be filled by synthetic, which in effect, means U.S. capacity, for most of the world's synthetic facilities are concentrated here.

Currently the U.S. is using about 40% synthetic rubber, 40% natural rubber and 20% reclaim. The breakdown applies to the third quarter of this year, is the first time synthetic and natural have been equal. (In contrast, foreign countries generally use 95% natural, 5% synthetic.)

Of the four basic types of synthetic* rubber commonly consumed in industry today, GR-S comprises approximately 80% of all synthetic produced and most closely resembles natural in applications. GR-S, of course, is a progeny of butadiene and, via styrene and ethyl benzene, of benzene. The rubber will probably nudge the latter's consumption in styrene to a level close to 110 million gal./year by 1956—some 26 million gal. over the Korea-peak year's ('51) 84 million.

Bulk of the million lbs./year or so

* GR-S, butyl or GR-I, buna N or GR-A (butadiene-acrylonitrile), neoprene (polymer of chlorobutadiene).

MARKETS . . .

of butadiene produced in the U.S. also goes into GR-A and CR-S as the senior end of a 75%-25% by weight ratio with the styrene.

GR-S consumption, chiefly in tires, is now hovering at about 500,000 tons/year, but is expected to jump to well over 600,000 within the next two years.

Inside Push: Butyl rubber (isobutylene-isoprene) however, is more intimately involved in this year's major switch to the use of tubeless tires. Until now about 95% of all the butyl made in this country was consumed in the production of inner tubes. Actually, butyl has just about displaced natural in this use.

Consumption of U.S.-made butyl has steadily inched upward over the past few years:

U.S. Butyl Consumption (long tons)

1950	61.4
1951	68.0
1952	69.0
1953	76.5

In line with the general rubber slack-off during '54, butyl use, at the end of the three-quarter mark was running about 13,600 tons less than last year. The score at the end of nine months: for '54, 42,463 tons; '53, 55,831 tons.

Consensus among qualified experts, however, tab 1955 as the year in which the conventional tube makes its last great stand. Probably 65% of the replacements then will be tubed tires, only 35% of the newer tubeless. It should take about three years to replace the inner tubes on most of America's cars, but sooner than that, perhaps by 1956, at least 90% of original equipment will be tubeless.

Despite the changeovers, however, and contrary to most nontrade thinking, the tubeless tire will have little or no effect on natural or synthetic con-

sumption. Reason: a tubeless tire is simply a casing that is airtight, instead of a container for an inner tube; the liner takes just about as much butyl or natural rubber as would a separate tube.

Thus, butyl's consumption future, like GR-S, is not gloom-tinged. And for the same reason—more cars, more wheels to be rubber-shod. And while chemical makers are heartened by the optimistic outlook of widening tire markets, the major tire producers are solidly pushing the tubeless conversion. Here's what the four top makers tell CW they're doing:

- Goodrich, by the end of this year, will have spent more than \$30 million for expansion largely needed for tubeless tires, plans an outlay of \$100 million in a 5-year program. Already about 75% of its passenger car tire output is assigned to the new type. Late last month the company, too, underlined its own—and the industry's—sentiments concerning the tubeless future. It unveiled a line for other than passenger car use, including a heavy tubeless for trucks, one for farm tractors, nylon tubeless tires for both jet and heavy bombers, and a wide-based tire for earthmoving and construction equipment.

- Firestone, which claims to have been first to develop and test a complete line, just a few weeks ago, added a variety of tubeless truck tires and wheels with drop-center rims. Firestone also startled the trade by revealing, for the first time, some tubeless production figures. By year's end the company will have turned out more than 5 million units; is currently producing at a rate exceeding a million/month. By then, too, about 80% of its passenger tire capacity will be tubeless.

- U.S. Rubber is turning out tubeless at all four of its tire making plants (Chicopee Falls, Mass.; Eau Claire, Wis., Los Angeles, Detroit). At least half of its passenger tire output will be tubeless by the first of the year.

- Earlier this year Goodyear also converted about 50% and at the time expressed belief that production capacity was large enough to meet 1955 automobile demand.

Not particularly concerned with original equipment (the tire auto makers put on new cars), General Tire, which leads the van of strictly replacement tire producers, is also altering its output schedules in favor of the tubeless. But General has its eye on markets some three or four years hence, by which time replacements are expected to be in full swing.

In the future, too—and some think not too far distant—is the fabulous tire

that will last the lifetime of the car. But chemical sellers need no urging to keep an ear close to the hum of significant synthetic developments. Work with the new isocyanate rubbers, for instance, presages virtually sure hikes in consumption of adipic acid, ethylene, and propylene glycols—just a few more chemicals for rubber's multimillion dollar shopping bag.

Up for Aluminum

Some segments of the chemical process industries are, by this week, already setting up output schedules for early next year. One prime gelling ingredient of the plans is the Office of Defense Mobilization's metal program for the first quarter. Announced last fortnight are these ODM allotments for the first three months of 1955: aluminum, 117,845,000 lbs.; copper and copper base alloys, 70,492,000 lbs.; steel, 601,323 short tons.

Thus, aluminum earmarked for "A" products is upped some 10% over the current quarter '54, while steel allotments are reduced 8% and copper 2%.

ODM carefully explains that the increased aluminum requirements do not necessarily indicate an increased military program. Even with an unwavering total production schedule, materials consumption will vary from quarter to quarter. Triple-pronged reason: vacillating inventory levels; changes in materials specifications; model revisions.

The "A" products allotments represent purchase authority to prime contractors and producers of specially designed military equipment for the three metals at the mill stage. The total quantities of steel, copper and aluminum to be set aside at this level will include added amounts needed by makers of civilian-type articles incorporated in military items. These are the products carried on the official class "B" products list of the Business & Defense Services Administration.

BDSA has announced that additional allotments of aluminum from the total supply available, will be set aside in the first quarter to fill Defense Dept. and Atomic Energy Commission orders. About 140 million lbs. will be reserved for these programs. That includes quantities necessary to meet defense-related "B" products, foil and ingot for powder.

This reserve is approximately 13 million lbs. more than the amount tagged for similar orders in the fourth quarter of '54. BDSA officials say the increase reflects a change in military requirements. Next year's first-quarter figure is estimated to be 16% of the

U.S. Rubber End Use Pattern Natural and Synthetic

Tires, tubes, tire sundries*	63.5%
Mechanical goods	11.0%
Latex foam	5.5%
Shoe products	4.5%
Insulated wire and cable	4.5%
Rubber footwear	2.0%
Other (sporting goods, hard rubber, sponge, etc.)	9.0%

*Includes patches, valves, camelback (recapping material).

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anticipated supply of domestic and imported primary aluminum for that period—1% over the current quarter's 15% of expected available material.

Under the Defense Materials System (in effect since July 1, '53), that portion of the aluminum supply available to the U.S. above the quantity set aside for defense and atomic energy needs and the national stockpile is freed for civilian consumption without any government restriction.

Aluminum-Magnesium Division officials emphasized that military con-

tractors and subcontractors placing purchase orders with aluminum producers against the upcoming quarter's reserves are required to identify such orders with appropriate defense symbols in accordance with DMS Regulation 1.

First-quarter reserves of copper and copper-base alloy products are estimated by BDSA at 126 million lbs., or about 7 million lbs. over this quarter's set-aside. The new reserves are to meet defense-related "B" products as well as Defense and AEC orders.

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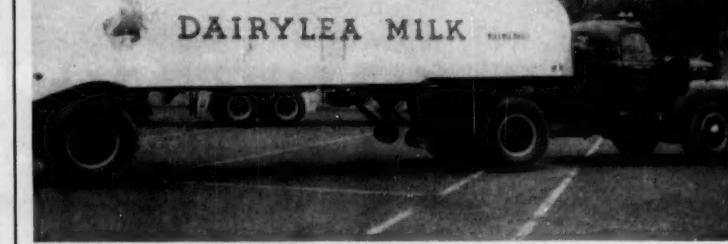
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Polyester Exhibition

IT'S HIGHLY IMPROBABLE that conventional truck building materials (e.g., wood, steel, aluminum) will ever be completely supplanted by plastics, but the markets for resins, fiber glass, plasticizers, fillers continue to broaden in ratio to the varied body types currently being produced.

At a recent Celanese-sponsored truck show at the company's Central Research Laboratory (Summit, N.J.), reinforced polyester resin use was spotlighted.

Included in the display were several plastic firsts: a single-piece milk tank trailer, an insulated chemical carrier with a double polyester outlet—the shell (inner tank), and the jacket (outer tank); a truck body specifically designed for the transportation of textiles. The milk trailer (see cut), approximately 27 ft. long, 58 in. high, weighs 7000 lbs., of which about 1400 lbs. is resin.

As a contrast to the larger tank



and truck types, the firm also showed a scooter (see cut), now being tested by the Army's Bureau of Ordnance at Aberdeen, Md. At present more than 300 of these vehicles are on trial by the Post Office Dept. The polyester resin-glass fiber-reinforced "Mailster" has a 1/4-ton capacity, is sturdy, has a moderate operation cost, and represents an estimated market for about 70 lbs. of resin per unit.

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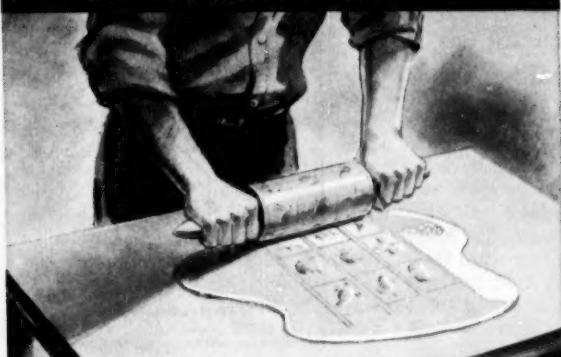
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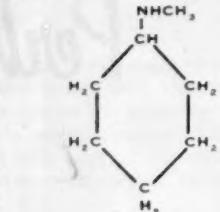
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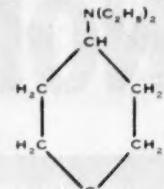
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Prelude to Rangeland Sales: Fact-finding

Cultivation of the chemical sale is almost always a multifaceted function. By any standard, learning facts for the sales argument is one of the most important.

Sometimes this task takes chemical men far afield from chemicals; fertilizer producers—for instance. Right now, they and federal and state researchers throughout the West are periodically weighing herds of grazing steers.

The idea behind it all: uncovering facts, figures and methods necessary to boost the efficiency of cattle ranching through rangeland fertilization. Once done, the fertilizer industry may well stand at the threshold of a vast new sales field. And, with population headed for the 200-million mark by 1975, the Golden West of yesteryear may be turning into the Fertilized West of tomorrow.

For, rangeland fertilization experiments are clearly indicating that it pays to spread granular fertilizer over the prairie; the grass grows greener, the cows grow fatter, the profits grow bigger. In one trial, 57 lbs. of nitrogen lifted beef output from 40.7 lbs./acre (control) to a profitable 105.3 lbs./acre.

Take California, for example, where

rangeland work is now well along. Here, Shell Chemical, Stauffer, DuPont, Atkins & Kroll, Best Fertilizers, and Wilson & George Meyer, are all eagerly cooperating with the University of California's Agricultural Extension Service's present large-scale tests. Another firm, Balfour Guthrie & Co., Ltd. is running its own tests. Already, Shell feels it can economically justify fertilization of any of the state's potential 47.15 million acres of grazing land (see map, p. 114).

Of the total California acreage of 100.4 million, only 36.4% now supports cattle and sheep herds. Subtracting land more profitably employed for crops leaves about 22.5 million acres. At 100 lbs./acre (which is what the results point to), this figures out to a staggering 1 million tons/year of nitrogen.

Or take a conservative estimate of 3 million acres the experts believe would benefit most. This area has a low enough elevation with sufficient rainfall and warmth to allow winter grass growth if fertilized. Alone, they would take 160,000 tons of fertilizer, equal to California's current total annual use.

Figures and Facts: What are the facts and experiments that may fatten

up fertilizer sales? About one year ago, UCAES launched its first field-size experiments as part of an over-all program for more profitable ranching. Working with cattlemen and farm advisors, covering 118 acres in five separate plots, the researchers dumped on 77 tons of fertilizer, including ammonium phosphates and sulfates, calcium nitrate, urea, and superphosphate. Then, after the grass came up, they loosed 693 cows. When the final roundup came a few months ago, these were the results:

- The grazing season was lengthened two months to include January and July. In one case alone, \$2000 in feed costs were saved. According to William Martin, UCAES agronomist, "The biggest opportunity for fertilizer is in increasing out-of-season growth, thereby reducing the need for purchased feed during winter months."

- Forage production climbed 3-5 times; in a few instances as much as 10 times.

- Nutritive content and palatability* of the grasses improved. One example: protein content went from 13.3% to 17.2% with 50 lbs. ammonium

*The cattle actually broke fences to feed on the fertilized areas.



DISTRIBUTION . . .

Story begins on p. 113

With this cheering backlog of facts already established as a base, this year's tests are being directed toward:

- Determination of optimum quantities of nitrogen and phosphorus.
- Discovery of the part phosphate plays.
- Establishment of the most economical methods, time, and number of applications.
- Evaluation of different soils and climates by including tests in different counties.

Available data leans sharply away from 50 lbs./acre as the optimum quantity. It's quite likely, that, in California at least, a 100-lb./acre (or even more) application in two shots (fall and early spring) will turn out the greatest ranch profits. And, once improved by the initial fertilization, the grass stand can take heavier nutrient doses.

What the phosphate requirement of grazing land may be, is a matter yet unsettled. Broadly, completed tests show phosphate application paying only when soil is deficient in the mineral. When not needed, its use slims otherwise sizable profits considerably (in one case from \$6.12/acre to \$2.41/acre).

Broadcasting granular fertilizers from airplanes, Shell finds, is by far the most practical, economical method of application. Using two planes, Shell recently spread 45,000 lbs. of ammonium sulfate in 2 hours, 45 minutes. Last year, ground spreaders took 17 days to do the same job.

Right now, Shell views the problem as education. First, industry must know what, when, where, and how to apply. Then they can educate the ranchers. And of course, once the ranchers buy the idea, greatly stepped up fertilizer sales result.

Currently, Shell's sulfate group plans to disseminate its findings through its distributors and the county agent. Also participating: UC's Agricultural Extension Service. It's bringing tours of cattlemen to the ranch-size plots. As Martin puts it, "They have come to scoff, have gone away wondering. One volunteered to make his own tests, is paying for fertilizer and application on 100 acres."

Federal interest in rangeland fertilization is also rising. The U. S. Dept. of Agriculture has now initiated tests at many stations throughout the Great Plains. From present knowledge, Robert Wagner, who'll head up the gov-

PART OF POTENTIAL: California rangeland could take 1 million tons of fertilizer. Even a conservative estimate ($\frac{1}{2}$ of lined area) would double total state use.

nium sulfate/acre; to 21.2% with a 100-lb. application.

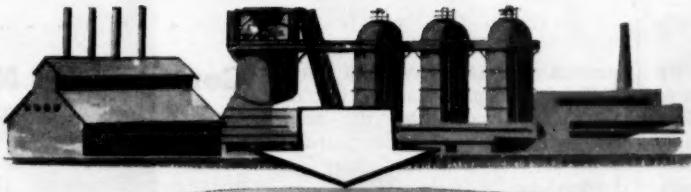
• Roots of fertilized grass subtended the moisture zone, drawing nourishment from leached nitrogen there. Unfertilized grass roots stayed in the soil dry zone, more prone to draught trauma.

• Most significantly, boosted beef production (up 2-3 times) repaid the cost of materials and applications, usually returned a healthy net profit. Some figures: application of 108 lbs. of urea and 135 lbs. of superphosphate/acre at a total cost of \$13.52/acre (including \$2.26 application expense) returned an additional 79.64

lbs./acre of beef with a net profit of \$2.41/acre.

Using a split treatment (December and March), 300 lbs. of calcium nitrate produced a net profit of \$6.45/acre. But in another trial ammonium sulfate and superphosphate together yielded a profit of only 60¢/acre.

• Investment in rangeland fertilization adds return through a "broadened base of operations." By being able to raise more cows per acre or more beef per steer without jumping costs (save that attributable to fertilization), the rancher gets more return from his fixed costs. (It takes just as much effort to sell a skinny steer as a fat one.)



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DISTRIBUTION . . .

ernment's program, thinks Western ranges need about 40-50 lbs. of nitrogen per acre.

Much of the West's 800-900 million acres of rangeland receives less than 5-6 in./year of rain. Because minimum rainfall for crop fertilization is roughly 15-20 in., the lack is probably the biggest rangeland program hurdle.

The National Fertilizer Assn. figures present conditions would support 50 lbs./acre in the West, up to 450 lbs. in the East. In 1950, NFA estimates 0.92 million tons went on grasslands; in 1953, 1.4 million. Despite Western aridity, one NFA expert predicts annual use will rise 2-10 million tons in a few years.

Range activity by the industry east of California appears relatively limited now. Allied has an agronomist active, is working with the USDA, and making materials available. Mathieson sends an agronomist through Texas, who stages demonstrations showing benefits of rangeland fertilization. And it helps out with a university farm,

sponsors radio talks five times weekly in Texas, plugging pasture fertilization. Spencer promotes the South heavily for "12-month green pastures" for both beef cattle and dairy production.

The ultimate market spawning from the rangeland is difficult to assess. Research has fact-finding to do. Longer ranch cattle-fattening might clip corn consumption (but Corn Industries Research Foundation doubts any decrease, notes that only 10% of corn output goes to beef cattle). And there's the possible switch to Southern beef-raising on nitrogen-producing pastures. Even if this unlikely (according to the American Meat Institute) event occurred, phosphate and potassium demand would be heavy and nitrogen would still be needed to start pastures. Too, synthetic nitrogen might prove cheaper than legumes.

Summing it up, as one nitrogen maker spokesman put it, "Rangeland fertilization's red-hot now. Its possibilities are tremendous."

Consolidation Move

Local shippers in the Tacoma and Seattle, Wash., area will now be able to ship cheaper, the result of a recent Interstate Commerce Commission order.

ICC has just approved a pool-car consolidation service. Offered to local shippers by the Pacific Storage & Distributing Co., the service will permit several shippers to combine traffic, obtain savings from carload or truckload mixtures.

The Tacoma-Seattle service is a typical result of recently ordered ICC freight tariff provisions; under the new rules many commodities may now be shipped in one carload at individual carload rates applicable to each commodity separately.

Motor-freight carriers, well aware that the new ICC orders mean stepped-up competition, have inaugurated similar practices both locally and transcontinentally.

For Your Reference: Bulletin on M-S catalyst—new technical data on Davison's synthetic cracking catalyst. Address inquiries to Petroleum Catalyst Dept., Davison Chemical Co. (division of W. R. Grace & Co.), Baltimore, Md.

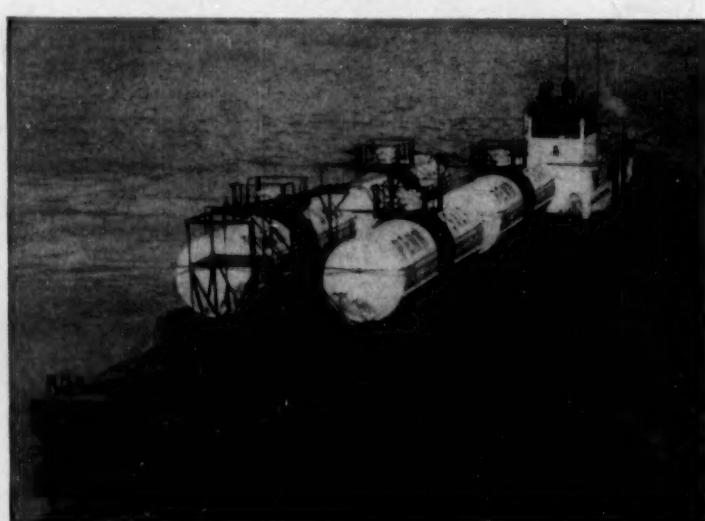
- "1955 Guide to Improved Packaging With Bakelite Plastics and Resins" (G-21)—an 8-page booklet of suggestions and applications for packaging consumer and industrial products. Bakelite Co. (division of Union Carbide and Carbon Corp.), New York, N.Y.

- Foreign trade—52-page World Trade Data booklet presents results of an exporter (3200) questionnaire on payment terms abroad. Also included: charts of mail, telephone, radio and cable message rates and regulations; directory listings of foreign freight forwarders and international advertising media. Exporters' Digest, New York 7, N.Y. Price: 50¢.

- Textile Material Standards—official ASTM standards includes test methods, tolerances, term definitions, and recommendations for various textile materials. American Society for Testing Materials, Philadelphia.

- Mercaptosuccinic Acid—6-p. leaflet containing outlines of major chemical reactions, suggested uses, physical properties, and a bibliography. National Aniline Div., Allied Chemical & Dye Corp., New York City.

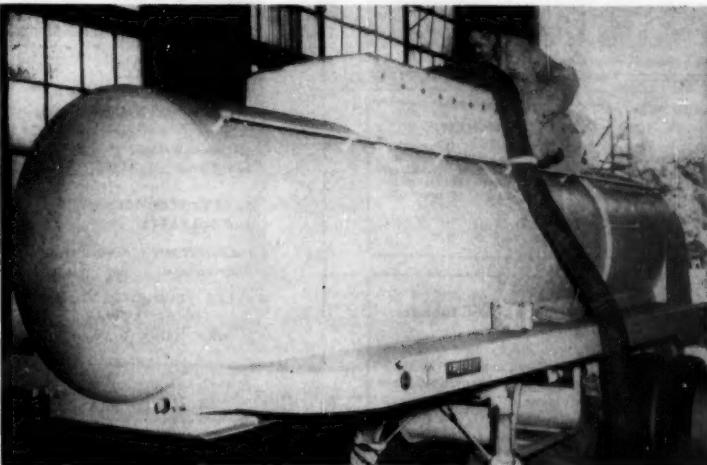
- Nitrogen solutions—leaflet offering general information, crystallization temperature data, and shipping information for fertilizer solutions. Commercial Solvents Corp., Agricultural Chemical Sales Dept., New York City.



Chlorine Cruises the River

SHIP IT BULK, ship it water. More and more, that's the specification being posted now by traffic departments in chemical companies. Latest on the list: Pennsylvania Salt's Portland, Ore., liquid chlorine plant. Now they're shipping chlorine to customer Crown Zellerbach's paper mill 10 miles away on the Willamette River.

Pennsalt ran four already available tank cars onto a standard rail-tracked barge, secured them with turnbuckles. Upon arrival at CZ's plant upriver, the chlorine is discharged directly without moving the cars. This method, the company contends, eliminates handling 120 one-ton cylinders, saves money, and even shaves delivery time.



Rubber Against Corrosion

RUBBER-LINING this tank trailer provides needed protection against corrosive chemical bleaching solutions. Here, the B. F. Goodrich Co.'s Industrial Products Division is applying a rubber lining to steel. How

it's made: two layers of soft rubber sandwich one layer of acid-resistant rubber; the three layers are then vulcanized together to form the protective lining. Full, the tank trailer contains 2200 gals. of bleach.



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LEDERLE'S DISPLAY: For an annoying ailment, it offers a prescription.

Counteracting a Common Complaint

For several months now (CW, May 22, p. 21) members of the American Pharmaceutical Manufacturers' Assn. have been wrestling with the problem of how to help the druggist assuage the indignation of cost-sensitive prescription customers.

Latest ammunition for the complaint-beset pharmacist is a six-piece window display (see cut) now being

offered by Lederle Laboratories Division, American Cyanamid Co. Complaint counteractant, the Lederle piece features a five-point check list of reasons "why prescriptions really cost so little." The reasons:

- "They are so effective."
- "You get well quicker. Time in bed is money lost."
- "They reduce the total cost of

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Streamlined Movement

Movement is at best a necessary evil to be avoided as much as possible. Such is the conclusion of Willard Rockwell, president of Rockwell Mfg. Co.

And as a generalization, this aphorism summarizes the thinking of some top distribution authorities today. For, while acknowledging that modern industry depends upon effective material handling and transportation to accomplish its aims, the experts realize that efficient material distribution means, basically, a minimum of movement.

How to achieve this optimum, minimum condition of material distribution was the subject of much discussion recently. The occasion: a cosponsored (by The Material Handling Institute, The Chicago Assn. of Commerce and Industry, The Traffic Club of Chicago) conference on "New Concepts on the Economics of Integrating Material Handling and Transportation from the Management Viewpoint."

Three M's: Rockwell characterizes movement as the neglected operation of the three—measurement, modification, movement—customarily applied in making a product. As he describes it: "Who has paid attention to movement? In many plants it's marked as a great advance when a lift truck is substituted for a hand cart!"

The solution of this problem? Integration. Rockwell envisions the day when management will visualize the totality of movements, from supplier to plant, through the plant and from the plant to the ultimate point of consumption.

And in order to integrate these movements, forecasts Rockwell, perhaps a new executive position—that of manager of movement—will be created. His responsibility: controlling, through his subordinates, the materials handling engineer and the traffic manager, the power expended on movement, both inside and outside the plant.

Coordination: With similar attitude but varying approach, other conference speakers attacked the movement problem. Frank Cummings, of Drake, Startzman, Sheahan and Barclay, maintains, "The importance of coordi-

nation cannot be overemphasized." And whereas the coordination of intra-plant movement of materials has progressed, only now, Cummings points out, "are we entering the phase of tying in the internal and external movement."

Citing current examples of good and poor coordination, Cummings, like Rockwell, feels that a higher-echelon executive should be charged with "complete responsibility and authority to plan, schedule and control all physical distribution activities, both external and internal."

Industry vs Carriers: Arguing both sides of the relationship, two of the speakers discussed the shortcomings and the achievements of the transportation field in integrating material handling for the benefit of manufacturers.

Lever Brothers' R. C. Waehner declares that "transportation has not kept pace with the development of modern material handling methods undertaken in our industrial plants."

John Emery, head of Emery Air Freight, feels, on the other hand, that responsibility for lack of distribution efficiency lies in the hands of industry users. "The best transportation service," avers Emery, "loses much of its value if its users in industry fail to adjust their own operations to take full advantage of it."

Emery cites examples where carrier research is providing improved materials handling systems. Some of these:

- More effective terminal layouts, and operating methods.
- Improved handling of dangerous cargos.
- Faster turn-around of ships and mechanical stevedoring.
- New types of barges, compartment railroad cars, specialized trucks.

Touching briefly upon the future of air freight, Emery labels it the "adjustment factor" in speeding up transportation lines of the future. Assuming that transportation methods to come will approach the assembly line flow of automobile companies, air freight, Emery foresees, will provide the emergency supply line whenever the normal flow is interrupted.

Neglected No Longer: Whether any member left the conference feeling that his immediate transportation problems had been solved is doubtful. But that much serious thought might stem from the occasion seems likely. For as Rockwell phrases the situation: "Once management begins to look at materials handling in terms of the whole, it can't help realizing that the problem of movement deserves more than an occasional second look from a third vice-president."

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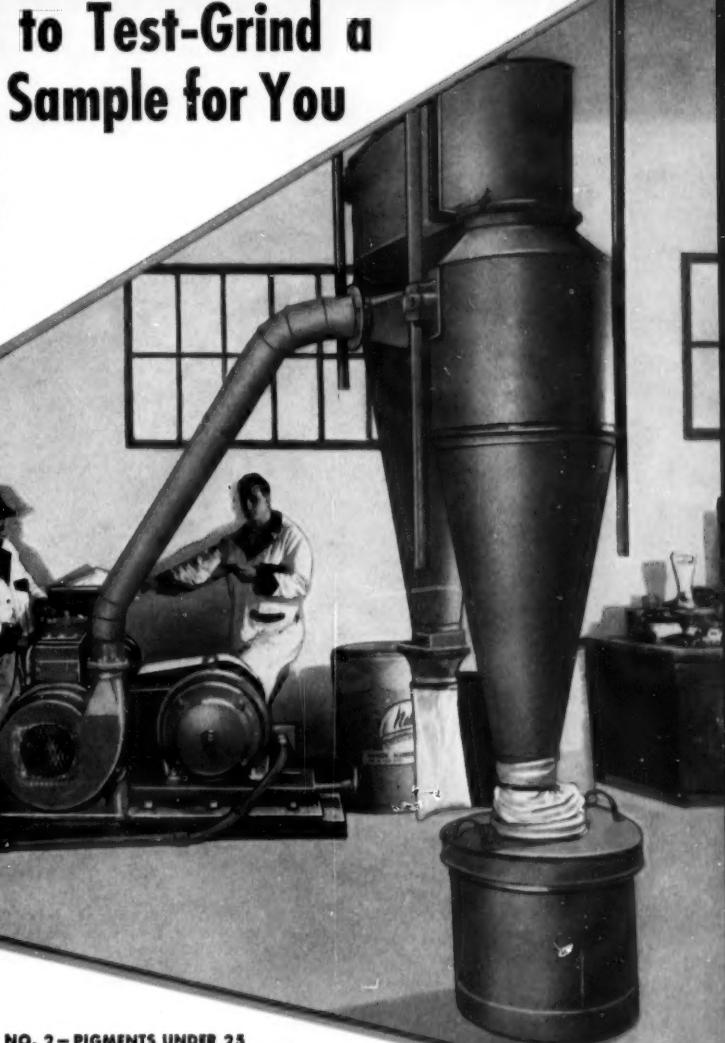
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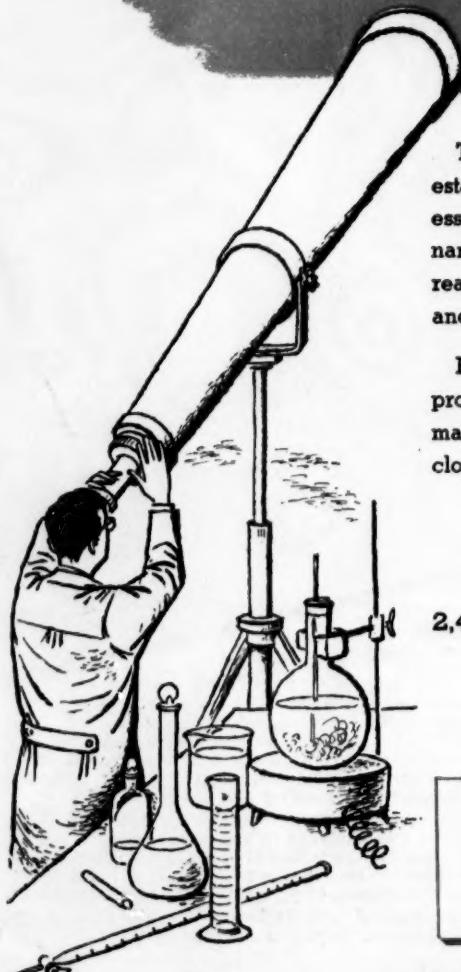
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